| Table J-8. Studies evaluating independent predictive value of BNP for the outcome of morbidity | | | | | | | | |
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| **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,)** |
| Singer17  2009 | RCT  Patients presenting to ED with signs and symptoms of HF | n=472  mean age:  64y (NR)  51% male | ADM Mean: Experimental=  1,189  Control=1,096  D/C mean: NR  Cutpoint: NR | Serial BNP testing, age, gender, BUN, creatinine, systolic BP, heart rate | 30d  ICU ADM  (NR) | Multivariable logistic regression | Age, gender, BUN, creatinine, systolic BP, HR | Knowledge of ADM and serial testing vs. control: ADM: OR=0.7 (0.2-2.1) |
| Serial BNP testing, age, gender, BUN, creatinine, systolic BP, heart rate | 30d  HF reADM  (NR) | Multivariable logistic regression | age, gender, BUN, creatinine, systolic BP, HR | Knowledge of ADM and serial testing vs. control: OR=0.8 (0.5-1.3) |
| Allen34  2011  EVEREST Study | Case series  Secondary analysis of RCT data  Patients hospitalized with HF (BNP 500-999 vs. BNP <500) | n=1,047  mean age:  NR  % male: NR | ADM mean: NR  D/C mean: NR  Cutpoint: NR | BNP, age >70y, diabetes, history of stroke, arrhythmia, BB, BUN, hyponatremia, hypernatremia, KCCQ | 24w  Unfavorable QoL  (NR) | Modified poisson regression | Age >70y, diabetes, history of stroke, arrhythmia, BB, BUN, hyponatremia, hypernatremia, KCCQ | D/C: RR=1.15 (0.81, 1.62) |
| Case series  Patients hospitalized with HF (BNP 1,000+ vs. BNP <500) | n=1,112  mean age:  NR  % male: NR | ADM mean: NR  D/C mean: NR  Cutpoint: NR | BNP, age >70y, diabetes, history of stroke, arrhythmia, BB, BUN, hyponatremia, hypernatremia, KCCQ | 24w  Unfavorable QoL  (NR) | Modified poisson regression | Age >70y, diabetes, history of stroke, arrhythmia, BB, BUN, hyponatremia, hypernatremia, KCCQ | D/C: RR=1.22 (0.85, 1.75) |
| Allen  2011  EVEREST Study  (cont’d) | Case series  Patients hospitalized with HF (BNP 500-999 vs. BNP <500) | n=1,047  mean age:  NR  % male: NR | ADM mean: NR  D/C mean: NR  Cutpoint: NR | BNP, age >70y, diabetes, history of stroke, arrhythmia, BB, BUN, hyponatremia, hypernatremia, KCCQ | 24w  Rehospitalization  (NR) | Multivariable cox regression | Age >70y, diabetes, history of stroke, arrhythmia, BB, BUN, hyponatremia, hypernatremia, KCCQ | D/C: HR=1.51 (1.18, 1.93) |
| Case series  Patients hospitalized with HF (BNP 1,000+ vs. BNP <500) | n=1,112  mean age:  NR  % male: NR | ADM mean: NR  D/C mean: NR  Cutpoint: NR | BNP, age >70y, diabetes, history of stroke, arrhythmia, BB, BUN, hyponatremia, hypernatremia, KCCQ | 24w  Rehospitalization  (NR) | Multivariable cox regression | Age >70y, diabetes, history of stroke, arrhythmia, BB, BUN, hyponatremia, hypernatremia, KCCQ | D/C: HR=1.70 (1.34, 2.15) |

| Table J-8. Studies evaluating independent predictive value of BNP for the outcome of morbidity (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,)** |
| Neuhold38  2010 | Cohort  Patients with chronic systolic HF | n=181  mean age:  70y (12)  65% male | ADM mean:  658.14  D/C mean:  460.54  Cutpoint: NR | BNP D/C, copeptin, MR-proADM, MR-proANP, CT-proET-1 | 24m  Rehospitalization for worsening HF  (72, 181) | Multivariable cox regression | Age, gender, GFR, diabetes, ischemic etiology of HF | D/C: HR=NR, p=NS |
| Stoiser4  2006 | Cohort  Patients diagnosed with chronic HF admitted to hospital | n=268  mean age:  71y (13)  67% male | ADM mean:  699 (811)  D/C mean: NR  Cutpoint: 448 | BNP at D/C, copeptin, age, history of diabetes, HT, CAD, kidney dysfunction, gender | 24m  Chronic HF reADM  (122, 268) | Multivariate cox regression | Age, history of diabetes, HT, CAD, kidney dysfunction\*, gender | D/C: chi-square 18, p=0.0001 |

**Abbreviations:** ADM = admission; BB = betablocker; BNP = B-type natriuretic peptide; BP = blood pressure; BUN=blood urea nitrogen; CAD = coronary artery disease; 95% CI, = confidence interval; CT-proET-1 = C-terminal pro-endothelian-1 precursor fragment; CV = cardiovascular; d = day(s); D/C = discharge; ED = emergency department; EVEREST = Efficacy of Vasopressin Antagonism in HF Outcome Study with Tolvaptan; HF = heart failure; HR = hazard ratio; hs-CRP = high-sensitivity c-reactive protein; HT = hypertension; ICU = intensive care unit; KCCQ = Kansas City Cardiomyopathy Questionnaire; m = month(s); MR-proADM = midregional pro-adrenomedullin; MR-proANP = midregional pro-atrial natriuretic peptide; n=number; NR = not reported; NS = non-significant; NT-proBNP = N-terminal pro-B-type natriuretic peptide; NYHA = New York Heart Association; OR = odds ratio; pg/mL = picograms per milliliter; QoL = quality of life; RR = relative risk; SD = standard deviation; vs. = versus; w = week(s); y = year(s)