**Online Resource 5. Overview of cost estimates**

| Reference            | Population (subgroup) | Sample size (no. with event) | Price/cost year | Follow-up duration | Reported mean cost, $US | Mean cost, $US 2019 values | Author’s description of categories | Resource use valuation |
|----------------------|-----------------------|------------------------------|-----------------|--------------------|-------------------------|-----------------------------|-----------------------------------|------------------------|
| Adamson, 2016†[90]   | HFH                   | 148,803                      | 2015            | Average follow-up: 1.8 years | $37,854                 | $42,231                     | Annual HF hospitalization cost burden per patient | Costs                  |
|                      |                       |                              |                 |                    | $23,958                 | $26,728                     | Average cost of a HF hospitalization |                       |
| Adejumo, 2019[60]    | HF with PEM           | 32,771                       | 2014            | Initial hospitalization | $35,290                 | $40,407                     | Total cost of HF hospitalization | Costs                  |
|                      | HF wo PEM             | 508,908                      |                 |                    | $26,616                 | $30,475                     |                                    |                       |
| Akintoye, 2017[116]  | HF                    | 1,946,895                    | 2013/14*        | -                  | $7,248*                 | $8,299                      | Cost of HF hospitalization | Costs                  |
|                      | HF in Northeast       | 387,280                      |                 |                    | $8,102*                 | $9,277                      |                                    |                        |
|                      | (Weighted)            |                              |                 |                    | $7,203*                 | $8,247                      |                                    |                        |
|                      | Midwest               | 449,805                      |                 |                    | $6,366*                 | $7,289                      |                                    |                        |
|                      | (Weighted)            |                              |                 |                    | $8,898*                 | $10,188                     |                                    |                        |
|                      | South (Weighted)      | 798,770                      |                 |                    |                         |                             |                                    |                        |
|                      | West (Weighted)       | 311,040                      |                 |                    |                         |                             |                                    |                        |
| Akintoye, 2017[63]   | Total (weighted) -    | 1,946,830                    | 2013/14*        | -                  | $7,248*                 | $8,299                      | Cost of HF hospitalization | Costs                  |
|                      | Full cohort HF        |                              |                 |                    |                         |                             |                                    |                        |
|                      | Government (weighted) | 226,815                      |                 |                    |                         |                             | Charge of HF hospitalization | Charges & Costs using cost to charge ratios |
|                      | - Full cohort         |                              |                 |                    |                         |                             | Cost of HF hospitalization |                        |
|                      | Government            | 226,815                      |                 |                    | $25,229*                | $28,887                     |                                    |                        |
|                      | (weighted)            |                              |                 |                    | 7,200*                  | $8,244                      |                                    |                        |
|                      | - Full cohort         |                              |                 |                    | 19,652*                 | $22,501                     |                                    |                        |

**Pharmacoeconomics**

A Systematic Review of Medical Costs Associated with Heart Failure in the US (2014-2020)

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| Reference | Population (subgroup) | Sample size | Price/cost year | Follow-up duration | Reported mean cost, $US | Mean cost, $US 2019 values | Author's description of categories | Resource use valuation |
|-----------|-----------------------|-------------|-----------------|-------------------|--------------------------|----------------------------|----------------------------------|------------------------|
| **Not-for-profit (weighted) - Full cohort** | 1,430,240 | 2014 | One year | $7,462* | $8,544 | Cost of HF hospitalization | Costs |
| **For-profit (weighted) - Full cohort** | 289,775 | 2014 | One year | $24,338* | $27,867 | Charge of HF hospitalization | Charges |
| **Amin, 2019[74]** | 7,022 | 2016 | 6-year study period | $11,318 | $12,959 | hospitalization Cost per HF event (admission) | Costs |
| **Bress, 2016[44]** | 989 | 2014 | 6-year study period | $61,131 | $69,994 | Mean HF hospitalization charges | Charges |
| **Carey, 2016[53]** | - | 2011 | - | $6,089 | $7,583 | Cost of 30-day all-cause readmission (following HF hospitalization) | Costs |
| Reference          | Population (subgroup) | Sample size (no. with event) | Price/cost year | Follow-up duration | Reported mean cost, $US | Mean cost, $US 2019 values | Author's description of categories | Resource use valuation |
|--------------------|-----------------------|-----------------------------|-----------------|--------------------|-------------------------|----------------------------|----------------------------------|------------------------|
| Chung, 2019[55]    | HF                    | -                           | 2014            | -                  | $6,392                  | $7,319                     | HF Admission/ Readmission        | Costs                 |
| Corbisiero, 2016[50] | HF CRT-responder      | 103                         | 2010/11         | Average follow-up: 1.4 years | $7,205                  | $8,972                     | Annual cost of HF hospitalization (Post-implant HF hospitalization cost) | Costs                 |
|                    | HF-CRT-non-responder  | 32                          |                 |                    | $13,861                 | $17,261                    | Annual cost of HF hospitalization (Post-implant HF hospitalization cost) | Costs                 |
| Costanzo, 2016[45] | CHF                   | -                           | 2016            | -                  | $16,708                 | $17,960                    | CHF hospitalization cost         | Costs                 |
| Echouffo-Tcheugui, 2017[64] | HF              | 1,764                       | 2014            | One year           | $23,854                 | $27,313                    | Annual total medical cost (per person with HF), including inpatient, drug/medication/pharmacy, primary care/office/GP visits, outpatient visits, ED/AE visits, home health, and other (including nursing home, rehabilitation, vision, medical supplies, dental) | Costs                 |
|                    |                       |                             |                 |                    | $11,318                 | $12,959                    | Annual inpatient cost per patient |                       |
| Fitch, 2018[57]    | HF                    | 151,908                     | 2017            | Initial hospitalization | $12,650                 | $13,265                    | Average cost per HF admission including physician, ED visit, observation unit visit | Costs                 |
|                    |                       |                             |                 | 30 days after initial hospitalization | $5,992                  | $6,283                     | Average 30-day post-discharge cost following an HF admission (net 30-day baseline HF costs) |                       |
| Givertz, 2017†[34] | HFrEF                 | 1,851                       | 2015            | first 30 days (after WCHF onset) One year | $28,056                 | $31,300                    | HF-related hospital-based encounter charges (mean charge per patient) | Charges               |
|                    |                       |                             |                 | first 30 days (after WCHF onset) | $29,153                 | $32,524                    | HF-related hospital-based encounter charges (mean charge per patient) |                       |
|                    |                       |                             |                 |                    | $33,017                 | $36,835                    | All-cause healthcare cost (HF & non-HF) (mean charge per patient) |                       |
| Reference       | Population (subgroup) | Sample size (no. with event) | Price/cost year | Follow-up duration | Reported mean cost, $US | Mean cost, $US 2019 values | Author's description of categories | Resource use valuation |
|-----------------|-----------------------|------------------------------|-----------------|-------------------|------------------------|---------------------------|----------------------------------|----------------------|
| Henk, 2015[75] | Hyperlipidemia with a HF event | 50,660                       | 2012            | 30 days after initial hospitalization | $17,644                | $21,195                   | Medical, inpatient, emergency room, ambulatory, office visit, outpatient visit, other medical, pharmaceutical |                       |
|                 |                       | 46,611                       |                 | 1 year minus first 30 days | $29,672                | $35,643                   |                                   |                       |
|                 |                       | 50,660                       | 2012            | Year 1             | $45,098                | $54,173                   | (cost in year 1 including initial hospitalization costs) |                       |
|                 |                       | 26,250                       | 2012            | Year 2             | $24,860                | $29,863                   | (cost separately in year 2)          |                       |
|                 |                       | 14,563                       | 2012            | Year 3             | $21,859                | $26,258                   | (cost separately in year 3)          |                       |
| Hernández-Madrid, 2019[54] | HFH                | 58                           | 2016            | -                 | $15,770                | $16,951                   | HF hospitalization cost            | Costs                |
| Husaini, 2016[65] | HF                    | 57,219                       | 2010            | One year          | $76,839                | $98,599                   | Average hospitalization cost for HF alone: Costs/charges for HF alone (HF cost $), the amount associated with a patient discharged with HF as a primary diagnosis during the year | Charges |
|                 |                       | 58,544                       | 2007            |                    | $71,995                | $102,214                  |                                  |                      |
|                 |                       |                              |                 |                    | $143,270              | $203,406                  | Total Average hospitalization cost: total hospital cost/charges for the year (Total cost $) that included HF cost plus the cost for the same patient when he/she was readmitted with diagnoses other than HF. |                      |
| Reference | Population (subgroup) | Sample size (no. with event) | Price/cost year | Follow-up duration | Reported mean cost, US | Mean cost, US 2019 values | Author's description of categories | Resource use valuation |
|-----------|-----------------------|-----------------------------|-----------------|-------------------|-----------------------|-----------------------------|-------------------------------|---------------------|
| Inampudi, 2019[66] | ESRD pts on hemodialysis with HFH | 812,089 | 2014 | One year | $8,178 | $9,364 | Average annual HF hospitalization cost | Costs |
| | ESRD pts on peritoneal dialysis with HFH | - | - | - | $8,248 | $9,444 | Average annual HF hospitalization cost | |
| Jackson, 2018[58] | Primary HF | 1,068,412 4,071,546 | 2014 | - | $44,841 | $51,342 | Total charge of HF hospitalization | Charges & Costs using cost to charge ratios |
| | Primary HF | - | - | - | $11,552 | $13,227 | Total cost of HF hospitalization | |
| | comorbid HF - Asthma | - | - | - | $38,062 | $43,581 | Total hospitalization charge | |
| | comorbid HF - Asthma | - | - | - | $9,691 | $11,096 | Total hospitalization cost | |
| | comorbid HF - COPD | - | - | - | $34,781 | $39,824 | Total hospitalization charge | |
| | comorbid HF - COPD | - | - | - | $9,111 | $10,432 | Total hospitalization cost | |
| | comorbid HF - Pneumonia | - | - | - | $44,977 | $51,498 | Total hospitalization charge | |
| | comorbid HF - Pneumonia | - | - | - | $12,240 | $14,015 | Total hospitalization cost | |
| | comorbid HF - CKD | - | - | - | $40,386 | $46,241 | Total hospitalization charge | |
| | comorbid HF - CKD | - | - | - | $10,782 | $12,345 | Total hospitalization cost | |
| | comorbid HF - Atrial fibrillation or flutter | - | - | - | $42,640 | $48,822 | Total hospitalization charge | |
| | comorbid HF - Atrial fibrillation or flutter | - | - | - | $10,942 | $12,528 | Total hospitalization cost | |
| Reference | Population (subgroup) | Sample size (no. with event) | Price/cost year | Follow-up duration | Reported mean cost, $US | Mean cost, $US 2019 values | Author's description of categories | Resource use valuation |
|-----------|-----------------------|-----------------------------|-----------------|-------------------|-------------------------|----------------------------|---------------------------------|------------------------|
|           | comorbid HF - Diabetes mellitus | -                           | 2011            | One year          | $55,272                 | $63,286                    | Total hospitalization charge  |                        |
|           | comorbid HF - Diabetes mellitus | -                           | 2011            |                   | $13,996                 | $16,025                    | Total hospitalization cost   |                        |
|           | comorbid HF - Hypertension   | -                           | 2011            |                   | $41,256                 | $47,238                    | Total hospitalization charge  |                        |
|           | comorbid HF - Hypertension   | -                           | 2011            |                   | $10,279                 | $11,769                    | Total hospitalization cost   |                        |
|           | comorbid HF - IHD            | -                           | 2011            |                   | $98,091                 | $112,313                   | Total hospitalization charge  |                        |
|           | comorbid HF - IHD            | -                           | 2011            |                   | $24,091                 | $27,584                    | Total hospitalization cost   |                        |
|           | comorbid HF - Stroke        | -                           | 2011            |                   | $66,653                 | $76,317                    | Total hospitalization charge  |                        |
|           | comorbid HF - Stroke        | -                           | 2011            |                   | $16,816                 | $19,254                    | Total hospitalization cost   |                        |
|           | comorbid HF - Depression or Alzheimer | -                   | 2011            |                   | $33,030                 | $37,819                    | Total hospitalization charge  |                        |
|           | comorbid HF - Dementia or Alzheimer | -                   | 2011            |                   | $9,901                  | $11,337                    | Total hospitalization cost   |                        |
|           | comorbid HF - Depression     | -                           | 2011            |                   | $26,992                 | $30,906                    | Total hospitalization charge  |                        |
|           | comorbid HF - Depression     | -                           | 2011            |                   | $7,600                  | $8,702                     | Total hospitalization cost   |                        |
| Khurmi, 2018[22] | Liver transplant patients admitted primarily with CHF | 1,853          | 2011            | One year          | $10,873                 | $13,540                    | Total hospital cost for HF admission |                        |
|           | Liver transplant patients admitted primarily with CHF to transplant hospital | 1,313          | 2011            |                   | $12,077                 | $15,039                    |                        | Costs using cost to charge ratios |
|           | Liver transplant patients admitted | 540                  | 2011            |                   | $8,777                  | $10,930                    |                        |                        |
| Reference          | Population (subgroup) | Sample size (no. with event) | Price/cost year | Follow-up duration | Reported mean cost, $US | Mean cost, SUS 2019 values | Author's description of categories | Resource use valuation |
|--------------------|-----------------------|------------------------------|-----------------|-------------------|------------------------|---------------------------|-----------------------------------|-----------------------|
| Kilgore, 2017[85]  | HFH                   | 63,678                       | 2015            | Follow up of 3 years (36 months) | $14,631                | $16,323                   | Average per-patient cost of a single HF-related hospitalization | Costs                 |
|                    |                       |                              |                 | Average per-patient cost of HF-related, CV-related, and all-cause hospitalizations over the observation period for Medicare beneficiaries with HF. | $16,000                | $17,850                   | Mean per-patient cost of a single CV-related hospitalization |                      |
|                    |                       |                              |                 |                   | $15,924                | $17,765                   | Mean per-patient cost of a single all-cause hospitalization |                      |
| Lahewala, 2019[67]| HF admitted in the same hospital/ HF admitted in different hospital | 715,993          | 2014            | 30 days           | $13,740                | $15,732                   | Cost of care of 30-day readmission in the same hospital/ in different hospital | Costs using cost to charge ratios |
|                    |                       |                              |                 | 30 days           | $22,602                | $25,879                   | Cost of care of 30-day readmission in the same hospital/ in different hospital |                      |
| Lee, 2014[81]     | HFH                   | 92,327c                      | 2009            | -                 | $11,313                | $15,012                   | Average Inpatient cost for HF | Costs using cost to charge ratios |
|                    |                       |                              |                 |                   |                        |                          | Cost of care of 30-day readmission in the same hospital/ in different hospital |                      |
| Mark, 2018[46]    | HFrEF on biomarker-guided strategy/HFrEF on usual care | 735c             | 2017            | Estimates over the available study follow-up Total follow-up: 2 years; | $47,683                | $50,000                   | Mean all-cause hospital cost (including physician fees) - all cause (HF and non-HF admissions) | Costs using cost to charge ratios |
|                    |                       |                              |                 |                   | $34,782                | $36,472                   | Mean all-cause hospital cost (including physician fees) - all cause (HF and non-HF admissions) |                      |
| Reference         | Population (subgroup) | Sample size (no. with event) | Price/cost year | Follow-up duration | Reported mean cost, $US | Mean cost, $US 2019 values | Author's description of categories | Resource use valuation |
|-------------------|-----------------------|------------------------------|-----------------|-------------------|-------------------------|----------------------------|-----------------------------------|------------------------|
| Obi, 2017[87]     | HF decedents          | 8,344                        | 2013            | One year          | $39,052                 | $45,784                    | Mean HF related medical costs over a year follow-up (cumulative) including, ambulatory, emergency services, hospitalization and other medical costs not included in the previous categories | Costs                  |
|                   | HF survivors           | 8,344                        |                 | One year          | $16,519                 | $19,367                    | Mean HF related medical costs (per patient per month) including, ambulatory, emergency services, hospitalization and other medical costs not included in the previous categories (per patient per month) |                        |
|                   | HF decedents          |                               |                 | 30 days           | $16,477                 | $19,317                    | HF related medical costs (per patient per month) |                        |
|                   | HF survivors           |                               |                 | 30 days           | $1,358                  | $1,592                     | Mean all-cause medical costs over a year follow-up (cumulative) including, ambulatory, emergency services, hospitalization and other medical costs not included in the previous categories |                        |
|                   | HF decedents          |                               |                 | One year          | $35,930                 | $42,124                    | Mean HF related hospitalization costs over a year follow-up (cumulative) |                        |
|                   | HF survivors           |                               |                 | One year          | $13,544                 | $15,879                    | Mean HF related hospitalization costs (per patient per month) |                        |
|                   | HF decedents          |                               |                 | 30 days           | $15,272                 | $17,905                    | HF related hospitalization costs (per patient per month) |                        |
|                   | HF survivors           |                               |                 | 30 days           | $1,113                  | $1,305                     | Mean all-cause medical costs over a year follow-up (cumulative) including, ambulatory, emergency services, hospitalization and other medical costs not included in the previous categories |                        |
|                   | HF decedents          |                               |                 | One year          | $60,048                 | $70,400                    | Mean all-cause medical costs over a year follow-up (cumulative) including, ambulatory, emergency services, hospitalization and other medical costs not included in the previous categories |                        |
|                   | HF survivors           |                               |                 | One year          | $32,394                 | $37,978                    | Mean all-cause medical costs over a year follow-up (cumulative) including, ambulatory, emergency services, hospitalization and other medical costs not included in the previous categories |                        |
| Reference | Population (subgroup) | Sample size (no. with event) | Price/cost year | Follow-up duration | Reported mean cost, $US | Mean cost, SUS 2019 values | Author's description of categories | Resource use valuation |
|-----------|-----------------------|------------------------------|-----------------|-------------------|------------------------|-----------------------------|----------------------------------|----------------------|
| Olchanski, 2018[23] | ADHF | 564 | 2014 | One year | $9,521 | $10,901 | Total cost of index HF hospital stay. | Costs |
| | HFpEF | 285 | | | $10,286 | $11,777 | Cost components include room and board, diagnostics, therapies, pharmacy, ED and overhead costs | |
| | HFpEF | 259 | | | $8,858 | $10,142 | | |
| Olchanski, 2020[77] | ADHF (HFpEF, HFpEF with & wo T2DM) | 544 | 2015 | - | $9,476 | $10,572 | Total cost of index HF hospital stay. | Costs |
| | HFpEF with T2DM | 124 | | | $11,576 | $12,915 | Direct cost components included room and board medical/ surgical, room and board ICU, and dietary/housekeeping services, diagnostics (core blood laboratory, radiation oncology, radiology, MRI, and other ancillary | |
| | HFpEF wo T2DM | 161 | | | $9,056 | $10,103 | | |
| | HFpEF with T2DM | 113 | | | $9,641 | $10,756 | | |
| Reference | Population (subgroup) | Sample size (no. with event) | Price/cost year | Follow-up duration | Reported mean cost, $US | Mean cost, $US 2019 values | Author’s description of categories | Resource use valuation |
|-----------|-----------------------|-----------------------------|-----------------|-------------------|------------------------|-----------------------------|--------------------------------|------------------------|
|           | HFpEF wo T2DM         | 146                         |                 |                   | $8,026                 | $8,954                     | diagnostic testing), therapies (operating room, electrophysiology laboratory, and cardiac catheterization laboratory), pharmacy, and others (blood bank and emergency department) |                       |
|           | ADHF (HFrEF, HFpEF) with & wo T2DM | 544                         | 2015            | -                 | $2,199                 | $2,453                     | Total cost per day for Index HF hospital stay |                       |
|           | HFrEF with T2DM       | 124                         |                 |                   | $2,205                 | $2,460                     |                                           |                       |
|           | HFrEF wo T2DM         | 161                         |                 |                   | $2,115                 | $2,360                     |                                           |                       |
|           | HFpEF with T2DM       | 113                         |                 |                   | $2,411                 | $2,690                     |                                           |                       |
|           | HFpEF wo T2DM         | 146                         |                 |                   | $2,121                 | $2,366                     |                                           |                       |
| Park, 2015[47] | CHF                  | 458,620                     | 2011            | One year          | $22,498*               | $28,017                     | Median hospital charge for CHF inpatient care |                       |
| Park, 2017[89] | Hypertension with CHF | 26,049*                     | 2014            | One year          | $17,063                | $19,537                     | Mean annual total medical expenditures included the total of all expenditures paid by all payers, including Medicare, Medicaid, other public insurance, private insurance, and payments made by the adult with hypertension or that person’s family during the calendar year. The expenditures included those for inpatient hospitalizations, outpatient visits, emergency department visits, office-based physician visits, home healthcare visits, and prescription medications. |                       |
| Polson, 2017[68] | HF on RAASi optimal dose | 3,426                       | 2015            | One year          | $12,752*               | $14,226                     | Median overall medical cost including inpatient, outpatient, office visits, ED visits, medications (pharmacy costs) |                       |
|           | HF on RAASi suboptimal dose | 4,699                       |                 |                   | $19,230*               | $21,454                     |                                           |                       |
| Reference | Population (subgroup) | Sample size (no. with event) | Price/cost year | Follow-up duration | Reported mean cost, SUS | Mean cost, SUS 2019 values | Author's description of categories | Resource use valuation |
|-----------|-----------------------|------------------------------|----------------|-------------------|------------------------|----------------------------|----------------------------------|------------------------|
|           | HF no RAASI           | 4,555                        |                |                   | $18,969*               | $21,162                    |                                  |                        |
|           | HF & CKD on RAASI optimal dose | 184                          |                |                   | $22,672*               | $25,294                    |                                  |                        |
|           | HF & CKD on RAASI suboptimal dose | 507                          |                |                   | $30,956*               | $34,535                    |                                  |                        |
|           | HF & HK on RAASI optimal dose | 11                           |                |                   | $48,403*               | $54,000                    |                                  |                        |
|           | HF & HK on RAASI suboptimal dose | 90                           |                |                   | $33,495*               | $37,368                    |                                  |                        |
|           | HF & HK no RAASI      | 144                          |                |                   | $36,923*               | $41,192                    |                                  |                        |
| Punekar, 2015[88] | Hyperlipidemia with a HF, Primary prevention cohort (case group⁵), patient with only 1 HF event | 1,541 | 2013 | Patients were followed up to 2 years after the diagnosis of Hyperlipidemia for the assessment of HF events | $69,771 | $81,799 | Mean 2-year total medical costs in the case group: patients with HF-event-related hospitalizations after the index date (i.e., diagnosis of hyperlipidemia) | Costs |
|           | Hyperlipidemia with a HF, Secondary prevention cohort (case group⁵), patient with only 1 HF event | 739 |    |                      | $66,087 | $77,480 | Total medical costs include Inpatient, ED visits, office visits, outpatient office visits and pharmacy costs (prescriptions) for patients with only 1 HF event | 1 HF event |
|           | Hyperlipidemia with a HF, High risk cohort (case group⁵), patient with only 1 HF event | 2,126 |    |                      | $63,390 | $74,318 |                                  |                        |
|           | Hyperlipidemia with a HF, Primary | 1,541 |    |                      | $64,167 | $75,229 | Mean 2-year Incremental costs equals all-cause cost for the case |                        |
| Reference | Population (subgroup) | Sample size (no. with event) | Price/cost year | Follow-up duration | Reported mean cost, $US | Mean cost, SUS 2019 values | Author's description of categories | Resource use valuation |
|-----------|-----------------------|-----------------------------|-----------------|-------------------|------------------------|-----------------------------|-------------------------------|---------------------|
|           | prevention cohort (incremental\(^b\)), patient with only 1 HF event | 739 | | | $55,996 | $65,649 | (patients with a HF-event) minus all-cause cost for the matched control (patient with no HF-event) | |
|           | Hyperlipidemia with a HF, Secondary prevention cohort (incremental\(^b\)), patient with only 1 HF event | 2,126 | | | $55,451 | $65,010 | Total medical costs attributable to HF event include inpatient, ED visits, office visits, outpatient office visits) and pharmacy costs (prescriptions) for patients with only 1 HF event | |
|           | Hyperlipidemia with a HF, High risk cohort (incremental\(^b\)), patient with only 1 HF event | 515 | | | $96,620 | $113,276 | Mean 2-year total medical costs in the case group: patients with HF-event-related hospitalizations after the index date (i.e., diagnosis of hyperlipidemia) | 2 HF events |
|           | Hyperlipidemia with a HF, Primary prevention cohort (case group\(^b\)), patient with only 2 HF events | 739 | | | $76,136 | $89,261 | Total medical costs include Inpatient, ED visits, office visits, outpatient office visits and pharmacy costs (prescriptions) for patients with only 2 HF events | |
|           | Hyperlipidemia with a HF, Secondary prevention cohort (case group\(^b\)), patient with only 2 HF events | 848 | | | $85,251 | $99,947 | | |
| Reference | Population (subgroup) | Sample size (no. with event) | Price/cost year | Follow-up duration | Reported mean cost, SUS | Mean cost, SUS 2019 values | Author's description of categories | Resource use valuation |
|-----------|-----------------------|------------------------------|-----------------|-------------------|------------------------|-----------------------------|---------------------------------|----------------------|
| Hyperlipidemia with a HF, Primary prevention cohort (incremental), patient with only 2 HF events | 515 | | | | $90,921 | $106,595 | Mean 2-year Incremental costs equals all-cause cost for the case (patients with a HF-event) minus all-cause cost for the matched control (patient with no HF-event) | |
| Hyperlipidemia with a HF, Secondary prevention cohort (incremental), patient with only 2 HF events | 739 | | | | $65,473 | $76,760 | Total medical costs attributable to HF event include inpatient, ED visits, office visits, outpatient office visits and pharmacy costs (prescriptions) for patients with only 2 HF events | |
| Hyperlipidemia with a HF, High risk cohort (incremental), patient with only 2 HF events | 848 | | | | $76,976 | $90,246 | | |
| Hyperlipidemia with a HF, Primary prevention cohort (case group), patient with only 3 HF events | 204 | | | | $95,393 | $111,838 | Mean 2-year total medical costs in the case group: patients with HF-event-related hospitalizations after the index date (i.e., diagnosis of hyperlipidemia) | 3 HF events |
| Hyperlipidemia with a HF, Secondary prevention cohort (case group), patient with only 3 HF events | 739 | | | | $92,482 | $108,425 | Total medical costs include Inpatient, ED visits, office visits, outpatient office visits and pharmacy costs (prescriptions) for patients with only 3 HF events | |
| Hyperlipidemia with a HF, High risk cohort (case | 453 | | | | $101,438 | $118,925 | | |
| Reference | Population (subgroup) | Sample size (no. with event) | Price/cost year | Follow-up duration | Reported mean cost, $US | Mean cost, $US 2019 values | Author’s description of categories | Resource use valuation |
|-----------|-----------------------|-----------------------------|-----------------|-------------------|-------------------------|-----------------------------|--------------------------------|----------------------|
| Hyperlipidemia with a HF, Primary prevention cohort (incremental\textsuperscript{h}), patient with only 3 HF events | 204 | | | | $89,004 | $104,347 | Mean 2-year Incremental costs \textit{equals} all-cause cost for the case (patients with a HF-event) \textit{minus} all-cause cost for the matched control (patient with no HF-event) | |
| Hyperlipidemia with a HF, Secondary prevention cohort (incremental\textsuperscript{h}), patient with only 3 HF events | 739 | | | | $80,646 | $94,548 | Total medical costs attributable to HF event include inpatient, ED visits, office visits, outpatient office visits and pharmacy costs (prescriptions) for patients with only 3 HF events | |
| Hyperlipidemia with a HF, High risk cohort (incremental\textsuperscript{h}), patient with only 3 HF events | 453 | | | | $92,392 | $108,319 | | |

| Raju, 2016\textsuperscript{[97]} | HFH with T2DM | 13,966 | 2015 | Index HF hospitalization Post discharge (post-Index: period duration varies for each patient)\textsuperscript{i} | $21,436 | $23,915 | HF hospitalization cost | Costs |
| | | | | Post discharge (post-Index: period duration varies for each patient)\textsuperscript{i} | $1,587 | $1,771 | Post-discharge HF-related costs (per patient per month) including inpatient, emergency room, physician office, other outpatient care | |
| | HFH without T2DM | 26,100 | | Index HF hospitalization | $20,906 | $23,323 | HF hospitalization cost | |

\textsuperscript{g} HFH with T2DM

\textsuperscript{h} HFH without T2DM
| Reference     | Population (subgroup) | Sample size (no. with event) | Price/cost year | Follow-up duration   | Reported mean cost, $US | Mean cost, $US 2019 values | Author's description of categories                                                                                           | Resource use valuation |
|---------------|-----------------------|------------------------------|-----------------|----------------------|-------------------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------|------------------------|
| Shamliyan, 2019†[49] | HFpEF                 | -                            | 2016            | -                    | $10,504 $41,940         | $11,291 $45,082            | Post-discharge HF-related costs (per patient per month) including inpatient, emergency room, physician office, other outpatient care | Charges & Costs        |
| Storrow, 2014[24] | AHF                   | 988,915                      | 2009            | One year            | $21088* $27,983         | $25,844                     | Hospital costs (hospital expenses), cost per discharge Hospital charges (amount billed to hospital for an entire hospital stay), charge per discharge | Charges                |
| Tuzovic, 2019[69]  | Cancer & HF           | 64,740                       | 2014            | -                    | $22,571 $30,402         | $25,844                     | Total hospitalization cost with primary oncologic diagnosis and comorbid HF Costs using cost to charge ratios            | Costs using cost to charge ratios |
| Voigt, 2014[25]    | SHF (unspecified)     | 2012                         | One year        | $11,565 $11,185      | $13,892 $13,436         | Cost per discharge; cost per case includes inpatient care Costs, Costs using cost to charge ratios | Costs, Costs using cost to charge ratios |
|                 | SHF (acute)           |                              |                 |                      | $10,434 $9,342          | $12,534 $11,222           |                                                                              |                        |
|                 | SHF (chronic)         |                              |                 |                      | $18,386 $9,152          | $22,086 $10,994           |                                                                              |                        |
|                 | SHF (acute on chronic)|                              |                 |                      | $11,185 $9,181          | $13,436 $11,029           |                                                                              |                        |
|                 | DHF (unspecified)     |                              |                 |                      | $9,342 $9,459           | $11,222 $11,362           |                                                                              |                        |
|                 | DHF (acute)           |                              |                 |                      | $9,342 $9,459           | $11,222 $11,362           |                                                                              |                        |
|                 | DHF (chronic)         |                              |                 |                      | $9,342 $9,459           | $11,222 $11,362           |                                                                              |                        |
|                 | DHF (acute on chronic)|                              |                 |                      | $9,342 $9,459           | $11,222 $11,362           |                                                                              |                        |
|                 | Combined SHF & DHF (unspecified) |            |                 |                      | $11,185 $9,181          | $13,436 $13,471           |                                                                              |                        |
| Reference | Population (subgroup) | Sample size (no. with event) | Price/cost year | Follow-up duration | Reported mean cost, SUS | Mean cost, SUS 2019 values | Author's description of categories | Resource use valuation |
|-----------|-----------------------|-------------------------------|----------------|-------------------|------------------------|-----------------------------|----------------------------------|----------------------|
| Wadhera, 2018[70] | Combined SHF & DHF (acute) | 2,948 | 2016 | 30 days | $15,423 | $16,578 | 30-day Medicare episode payment (per beneficiary) for HF patient admitted in hospital | Payment |
| Ward, 2014[71] | Diabetes with CHF complication | 92,917 | 2012 | One year | $23,758 | $28,539 | Event-year cost per patient refers to costs associated with management of an acute care episode (initial management in an inpatient, emergency department, or outpatient setting) and any subsequent care provided within the first year following the acute episode. Annual state cost per patient reflects annual resource use required beyond the first year for the ongoing management of the CHF complication and applies while that particular health state is present for the remainder of the patient’s life. Inpatient acute care for CHF complication (mean cost per stay) including physician fees per stay | Costs, Costs using cost to charge ratios |
| Woolley, 2016†[73] | HF with HK | 3,789 | 2015 | 30 days | $12,718 | $14,189 | 30-day total healthcare costs | Costs |
| | HF wo HK | 3,789 | 2015 | 30 days | $69,211 | $77,214 | 1-year total healthcare costs | |
| | | | | One year | $69,211 | $77,214 | |
| | Yoon, 2016[76] | HFb | 117,870 | 2010 | One year | $30,719 | $39,418 | Mean annual costs of Inpatient and outpatient care including medical/ | Costs |
| Reference            | Population (subgroup) | Sample size (no. with event) | Price/cost year | Follow-up duration | Reported mean cost, $US | Mean cost, $US 2019 values | Author's description of categories | Resource use valuation |
|----------------------|-----------------------|-----------------------------|-----------------|-------------------|-------------------------|---------------------------|-------------------------------|-----------------------|
| Ziaeian, 2015[72]    | AHF                   | 956,745                     | 2011            | One year          | $10,775                 | $13,418                   | Total costs per AHF hospitalization episode | Costs using cost to charge ratios |

ACEI/ARB: Angiotensin-converting enzyme inhibitor or angiotensin-receptor blocker, ADHF: Acute Decompensated Heart Failure, AHF: Acute heart failure, AKI: Acute kidney injury, AV: Atrioventricular, BIP: Traditional bipolar, CHF: Congestive Heart Failure, CKD: Chronic kidney disease, CRT: Cardiac resynchronization therapy, CRT-D: Cardiac resynchronization therapy defibrillator, CV: Cardiovascular Event, DHF: Diastolic heart failure, ED: Emergency department, ESRD: End-Stage Renal Disease, GP: General practitioner, HF: Heart Failure, HFH: Heart failure hospitalization, HFpEF: Heart Failure with preserved ejection fraction, HFrEF: Heart Failure with reduced ejection fraction, HFS: Heart failure syndrome, HK: Hyperkalemia, HR: High Risk, ICU: Intensive care unit, IHD: Ischemic heart disease, IQL: Interquartile limits, LVAD: Long-term venous assist device, PVD: Peripheral vascular disease, SBP: Systolic blood pressure, TIA: Transient ischemic attack.
Left ventricular assist devices, NR: Non responders, OHT: Orthotopic heart transplantation, OSA: Obstructive sleep apnea, PAP: Pulmonary artery pressure, PCC: Palliative care consultations, PEM: Protein-Energy Malnutrition, QUAD: Quadripolar, R: Responders, RA: Rheumatoid arthritis, RAASi: renin-angiotensin-aldosterone system inhibitor (agents), SAC/VAL: Sacubitril/ valsartan, SHF: Systolic heart failure, T2DM: Type 2 diabetes mellitus, VA: Veteran Affairs, wo: without
†Abstract, - Not reported/ not applicable, *Median
*For these years, authors describe data in terms of financial year, e.g. 2012/2013 was adjusted to 2013, 2013/2014 was adjusted to 2014, 2010/2011 was adjusted to 2011
US Veteran Health administration population
92,327 hospitalizations (population estimate = 976,664); hospitalizations (and not patient) were used as the unit of analysis
Biomarker-guided strategy: NT-proBNP-guided heart failure treatment strategy (target NT-proBNP level <1000 pg/mL); Usual care: optimal medical therapy
A total of 894 patients were enrolled at 45 clinical sites in the United States and Canada between January 2013 and study termination in July 2016. The economic study included the subset of 735 patients in the United States with sites that provide hospital billing data, and it excluded 159 patients who were either enrolled in sites not participating in the economic study (n=21) or enrolled in Canada (n=138).
2,653 US acute care hospitals; and 458,620 total discharges for CHF (and not patient) were used for analysis.
U.S. Hypertensive Adults, 2011–2014 Medical Expenditure Panel Survey (n=26,049); Number of patients per comorbidity group are not reported.
Incremental costs equals all-cause cost for the case (patients with an event) minus all-cause cost for the matched control (patient with no event); Mean 2-year total costs in the Case group: patients with HF-event-related hospitalizations after the index date (the case group); Mean 2-year total costs in the Control group: patients with no CV-event-related hospitalization (the control group)
Due to variable follow-up for each patient, outcomes were reported per patient per month (where applicable) by summing them over each patient’s duration of follow-up, dividing by their days of follow-up, and multiplying by 30.
Notes:
Charges refer to the initial, individual list prices a US hospital typically sets for the services it provides. Costs are the actual expenses incurred by a hospital in providing patient care (including the direct costs of patient care such as nursing, room and board, medicines and supplies; as well as overhead costs for administration etc.). Payment is the amount a hospital actually receives for providing patient care from the government (e.g., Medicare and Medicaid), private insurers, and sometimes the patients themselves. In some studies, Costs were calculated using hospital-specific cost-to-charge ratios (CCR) provided by the Centers for Medicare and Medicaid Services or the Healthcare Cost and Utilization Project (HCUP) CCR files.