**Economic implications of adding a novel algorithm to optimize cardiac resynchronization therapy: rationale and design of economic analysis for the AdaptResponse trial**

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**SUPPLEMENTAL APPENDIX**

**Figure A1**. Three types of readmission considered in German

Readmission

Same DRG Section

Same Major Diagnostic Category

Due to Complications

Cases are merged, if patients are hospitalized again within

the upper length of the stay of DRG (first stay)

Cases are merged, if diagnostic and therapy are done in two

separate hospital stays

* Within 30 days (starts with hospitalization of first stay)
* DRG of first stay has a medical partition or others
* DRG of second stay has a surgical partition

Cases are merged, if patients are hospitalized in consequence

of complications (in area of responsibility of the hospital)

within upper length of the stay of DRG (first stay)

**Table A1.** Heart Failure hospitalization statistics and applicable national tariffs in United States (US), Canada, England, Germany, France, Switzerland, and Japan

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Country** | **DRG Code** | **DRG Label** | **Number of hospital episodes per DRG**  | **Total expenditure per DRG** | **Average expenditure per DRG** | **Average expenditure for combined HF DRGs (2018 USD)** |
| US Medicarea | 291 | Heart failure & shock w mcc or peripheral extracorporeal membrane oxygenation (ecmo) | 369,287 |  | $8,214 | $7,389 ($7,389) |
| 292 | Heart failure & shock w cc | 104,082 |  | $5,616 |
| 293 | Heart failure & shock w/o cc/mcc | 36,153 |  | $4,064 |
| US Private Insuranceb | 291 | Heart failure & shock w mcc or peripheral extracorporeal membrane oxygenation (ecmo) | 19,262 |  | $12,677 | $12,235 ($12,235) |
| 292 | Heart failure & shock w cc | 11,946 |  | $12,471 |
| 293 | Heart failure & shock w/o cc/mcc | 3,651 |  | $9,133 |
| Englandc | EB03A | Heart Failure or Shock, with CC Score 14+ | 23,426 | £77,199,093 | £3,295 | £1,980 ($2,808) |
| EB03B | Heart Failure or Shock, with CC Score 11-13 | 41,789 | £102,593,387 | £2,455 |
| EB03C | Heart Failure or Shock, with CC Score 8-10 | 45,039 | £80,646,048 | £1,791 |
| EB03D | Heart Failure or Shock, with CC Score 4-7 | 46,458 | £61,226,546 | £1,318 |
| EB03E | Heart Failure or Shock, with CC Score 0-3 | 10,983 | £10,321,647 | £940 |
| Franced | 05M091 | Heart failure and circulatory shocks, level 1 | 8,089 | €20,645,069 | €2,552 | €3,543 ($4,178) |
| 05M092 | Heart failure and circulatory shocks, level 2 | 35,857 | €118,278,259 | €3,298 |
| 05M093 | Heart failure and circulatory shocks, level 3 | 43,029 | €192,919,661 | €4,483 |
| 05M094 | Heart failure and circulatory shocks, level 4 | 10,238 | €68,769,875 | €6,717 |
| 05M09T | Heart failure and circulatory shocks, very short stay | 19,833 | €14,084,207 | €710 |
| Germanye | F62A | Heart failure and shock with extremely severe complications or comorbidities, with dialysis or complicated diagnosis or with certain high-intensity intensive care treatment> 196/184/368 points or complex constellation | 1,516 | €15,815,185 | €10,432 | €7,664 ($9,037) |
|  | F62B | Heart failure and shock with extremely severe complications or comorbidities, with dialysis or complicated diagnosis or with certain disabilities with a high amount of efforts or without complex constellation, more than one day length of stay with a certain acute renal failure with extremely severe  complications or comorbidities | 3,381 | €27,007,023 | €7,988 |
|  | F62C | Heart failure and shock without extremely severe complications or comorbidities or without dialysis, without complicated diagnosis, without complex constellation, without certain disabilities with a high amount of efforts, more than one day length of stay without a certain acute renal failure with extremely severe or without complications or comorbidities | 286,720 | €2,274,796,339 | €7,934 |
|  | F62D | Heart failure and shock without extremely severe complications or comorbidities or without dialysis, without complex diagnosis, without complex constellation, without any particular high-level treatment, an occupancy day | 17,685 | €52,780,529 | €2,984 |
| Switzerlandf | F62A | Heart failure and shock with extremely severe CC, with dialysis or reanimation, or complication diagnosis | 786 | CHF 14,217,168 | CHF 18,088 | CHF 10,108 ($10,324) |
| F62B | Heart failure and shock with extremely severe CC | 4,916 | CHF 64,402,058 | CHF 13,100 |
| F62C | Heart failure and shock | 12,207 | CHF 102,398,420 | CHF 8,388 |
| Canadag | NA | NA | NA | NA | CAD 10,412 | CAD 10,412 ($8,028) |
| Japanh | NA | NA | NA | NA | ¥524,301 | ¥524,301 ($4,748) |
| Greecei | K42X | Heart Failure and Collapse without Catastrophic Co-existing Conditions and Complications and with Average Length-of-Stay  | NA | NA | €849 | NA |
|  | K42M | Heart Failure and Collapse with Catastrophic Co-existing Conditions and Complications and with Average Length-of-Stay | NA | NA | €1,868 | NA |

**Source:**

1. Data on file. Premier data. 2010-2018 using the Instant Health Data (IHD) platform (BHE, Boston, MA)
2. Data on file. Truven MarketScan. 2008-2017 using the Instant Health Data (IHD) platform (BHE, Boston, MA)
3. NHS Improvement. Reference costs for 2017/18. Accessible at: <https://improvement.nhs.uk/resources/reference-costs/#rc1718>. Reference cost tariffs are representative of the national average of volume of patients coded using each HRG Code for the year 2017-2018.
4. Public hospital statistics for 2018: Technical Agency for Information on Hospital Care (ATIH). Accessible at: <https://www.scansante.fr/applications/statistiques-par-groupes-diagnostique-actes>. 2018 tariffs were applied.
5. Hospital statistics for 2017: Institute for the Hospital Remuneration System (InEK). Accessible at: <https://www.g-drg.de/Datenbrowser_und_Begleitforschung/Datenveroeffentlichung_gem._21_KHEntgG/G-DRG-Browser_2017_2018>. 2017 tariffs were applied.
6. Hospital statistics for 2017: Federal Statistical Office (OFS). Accessible at: <https://www.bfs.admin.ch/bfs/en/home/statistics/catalogues-databases/press-releases.assetdetail.6406959.html>. 2017 tariffs were applied.
7. Charbonneau E, Parent H, O’Hara GE, Champagne J, Philippon F. Canadian Journal of Cardiology (2018), doi: 10.1016/j.cjca.2018.05.001.
8. Japan tariff of Diagnosis Procedure Combination (DPC) hospitalization fee.
9. Closed Consolidated Hospitalization Tariff (“Κλειστά Ενοποιημένα Νοσήλια” – KEN). Accessible at: <https://www.moh.gov.gr/articles/health/domes-kai-draseis-gia-thn-ygeia/kwdikopoihseis/kleista-enopoihmena-noshlia/1079-nea-lista-ken-apo-1-3-2012-kostos-mdn?fdl=3769>. 2012 tariffs remain valid and unadjusted. Please note Greek KEN prices do not include labor costs that are funded separately; only material and facility costs are included.

**Table A2.** Cost profile of HF hospitalization for CRT patients after implantation in the U.S. hospitals

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **HF Hospitalisation After CRT-D/CRT-P Implantation****(N=7,687)** | **Mean** | **%** | **SD** | **Min** | **P25** | **Median** | **P75** | **Max** |
|  |  |  |  |  |  |  |  |  |
| **Total Costs ($USD, 2018)** | **10,679.01**  | **100%** | **17,912.79** | **0** | **3,915.58** | **6,312.89** | **11,099.73** | **372,822.33** |
|  |  |  |  |  |  |  |  |  |
| Lab Exams | 754.84  | 7.07% | 1,155.55 | 0 | 305.70 | 488.15 | 820.52 | 32,641.52 |
| Emergency Room | 342.02  | 3.20% | 371.69 | 0 | 206.75 | 329.22 | 453.85 | 17,311.59 |
| Cardiology Ward | 502.90) | 4.71% | 1,391.13 | 0 | 46.79 | 191.55 | 398.40 | 60,670.70 |
| Operating Room | 537.25  | 5.03% | 4,980.86 | 0 | 0 | 0 | 56.35 | 245,098.17 |
| Other | 537.25  | 5.14% | 4,980.86 | 0 | 0 | 79.82 | 442.57 | 35,973.84 |
| Radiology | 338.01  | 3.17% | 514.60 | 0 | 74.22 | 165.20 | 387.69 | 10,206 |
| Respiratory  | 377.82  | 3.54% | 937.26 | 0 | 0 | 71.31 | 367.42 | 22,990.81 |
| **Room and Board** | **5,884.43**  | **55.10%** | **7,481.67** | **0** | **2,108.09** | **3,775** | **6,825.08** | **132,895.13** |
| Supplies | 1,161.89  | 10.88% | 9,015.55 | 0 | 0 | 49.68 | 257.63 | 316,933.64 |
| Therapy | 230.63  | 2.16% | 658.88 | 0 | 0 | 0 | 256.12 | 15,703.04 |
|  |  |  |  |  |  |  |  |  |
|  | **Mean** |  | **SD** | **Min** | **P25** | **Median** | **P75** | **Max** |
| **HF Hospitalisation Days-in-Hospital****(N=7,687)** | 5.11 |  | 4.94 | 1 | 2 | 4 | 6 | 93 |
| **HF Hospitalization Cost-Per-Day-Hospitalised****($USD, 2018, N=7,687)** | 2,122.58  |  | 2,052.63 | 0 | 1,305.28 | 1,731.37 | 2,339.25 | 70,948.56 |

Source: Data on file. Premier data. 2010-2018 using the Instant Health Data (IHD) platform (BHE, Boston, MA)