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ORIGINAL RESEARCH

Temporal Changes in Mortality After Transcatheter and Surgical Aortic Valve Replacement: Retrospective Analysis of US Medicare Patients (2012–2019)

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BACKGROUND: The treatment of aortic stenosis is evolving rapidly. Pace of change in the care of patients undergoing transcatheter aortic valve replacement (TAVR) and surgical aortic valve replacement (SAVR) differs. We sought to determine differences in temporal changes in 30-day mortality, 30-day readmission, and length of stay after TAVR and SAVR.

METHODS AND RESULTS: We conducted a retrospective cohort study of patients treated in the United States between 2012 and 2019 using data from the Medicare Data Set Analytic File 100% Fee for Service database. We included consecutive patients enrolled in Medicare Parts A and B and aged ≥65 years who had SAVR or transfemoral TAVR. We defined 3 study cohorts, including all SAVR, isolated SAVR (without concomitant procedures), and elective isolated SAVR and TAVR. The primary end point was 30-day mortality; secondary end points were 30-day readmission and length of stay. Statistical models controlled for patient demographics, frailty measured by the Hospital Frailty Risk Score, and comorbidities measured by the Elixhauser Comorbidity Index (ECI). Cox proportional hazard models were developed with TAVR versus SAVR as the main covariates with a 2-way interaction term with index year. We repeated these analyses restricted to full aortic valve replacement hospitals offering both SAVR and TAVR. The main study cohort included 245 269 patients with SAVR and 188 580 patients with TAVR, with mean±SD ages 74.3±6.0 years and 80.7±6.9 years, respectively, and 36.5% and 46.2% female patients, respectively. Patients with TAVR had higher ECI scores (6.4±3.6 versus 4.4±3) and were more frail (55.4% versus 33.5%). Total aortic valve replacement volumes increased 61% during the 7-year span; TAVR volumes surpassed SAVR in 2017. The magnitude of mortality benefit associated with TAVR increased until 2016 in the main cohort (2012: hazard ratio [HR], 0.76 [95% CI, 0.67–0.86]; 2016: HR, 0.39 [95% CI, 0.36–0.43]); although TAVR continued to have lower mortality rates from 2017 to 2019, the magnitude of benefit over SAVR was attenuated. A similar pattern was seen with readmission, with a lower risk of readmission from 2012 to 2016 for patients with TAVR (2012: HR, 0.68 [95% CI, 0.63–0.73]; 2016: HR, 0.43 [95% CI, 0.41–0.45]) followed by a lesser difference from 2017 to 2019. Year over year, TAVR was associated with increasingly shorter lengths of stay compared with SAVR (2012: HR, 1.91 [95% CI, 1.84–1.98]; 2019: HR, 5.34 [95% CI, 5.22–5.45]). These results were consistent in full aortic valve replacement hospitals.

CONCLUSIONS: The rate of improvement in TAVR outpaced SAVR until 2016, with the recent presence of U-shaped phenomena suggesting a narrowing gap between outcomes. Future longitudinal research is needed to determine the long-term implications of lowering risk profiles across treatment options to guide case selection and clinical care.

Key Words: aortic stenosis ■ length of stay ■ mortality ■ readmission ■ surgical aortic valve replacement ■ temporal trends ■ transcatheter aortic valve replacement

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CLINICAL PERSPECTIVE

What Is New?

- The rate of improvement in mortality, readmission, and length of stay and the magnitude of benefit after transcatheter aortic valve replacement has outpaced surgical aortic valve replacement across patient groups.
- Recent advances in procedural approaches, multimodality imaging, and the development of streamlined clinical pathways to support early safe discharge home after transcatheter aortic valve replacement have contributed to this temporal trend; the more established practices associated with surgical aortic valve replacement have not been similarly scrutinized.
- Both treatments offer excellent options for patients with aortic stenosis, depending on individual risk profiles and patients' goals of care.

What Are the Clinical Implications?

- There is a pressing need to ensure equitable access to high-quality transcatheter aortic valve replacement and surgical aortic valve replacement.
- Treatment decisions require individual risk stratification, the consensus decisions of expert multidisciplinary teams, and shared decision-making to consider patients' preferences and priorities.
- Future longitudinal research is needed to evaluate quality of care, patient-reported outcomes and experiences, and cost-effectiveness.

Nonstandard Abbreviations and Acronyms

AVR	aortic valve replacement
ECI	Elixhauser Comorbidity Index
HFRS	Hospital Frailty Risk Score
SAVR	surgical aortic valve replacement
TAVR	transcatheter aortic valve replacement

The treatment of aortic valve disease has evolved rapidly in the past decade. The increasing availability of transcatheter aortic valve replacement (TAVR) has augmented surgical aortic valve replacement (SAVR) as treatment options for patients of varying risk profiles. During this time, there have been significant improvements made to TAVR technology, imaging, procedural approaches, and processes of care that have contributed to improved outcomes.[1,2] In contrast, the procedural and technological environments of SAVR have remained more constant given that it is a more mature procedure with a well-established track record and historically excellent outcomes.[3] In this context, treatment decisions and patient access to SAVR and TAVR have been primarily driven by indications, health policy and funding, geographical location, and social determinants.[4,5] Although local access remains heterogenous, TAVR is surpassing SAVR as the most common form of isolated aortic valve replacement (AVR) in the United States and internationally.[6,7]

Differences in mortality have been scrutinized in multiple clinical trials comparing the 2 treatment modalities using various devices across evolving indications, including the more recent low surgical risk trials.[8,9] Yet, there is little on temporal trends in mortality for each modality in contemporary real-world practice to capture the evolution of treatment of aortic stenosis. There is a pressing need to explore changes in mortality in contemporary practice to inform clinical care, health policy, and shared decision-making. To this end, we examined temporal differences in clinical outcomes for patients undergoing TAVR and SAVR in the United States between 2012 and 2019.

METHODS

This retrospective cohort used data from the US Medicare Dataset Standard Analytic Files 100% fee-for-service database. The Medicare fee-for-service payer database includes information on the health care services that are covered for beneficiaries enrolled in Medicare parts A and B. Coding and validation details are outlined in Data S1. All data used to perform this analysis were deidentified and accessed in compliance with the Health Insurance Portability and Accountability Act. As a retrospective analysis of a deidentified database, the research was exempt from institutional review board review under 45 Code of Federal Regulations 46.101(b). The need for individual patient consent was waived. We adhered to the Strengthening the Reporting of Observational Studies in Epidemiology guidelines for reporting on cohort studies. The data can be provided upon reasonable request to the corresponding author.

Patient Cohort

We included patients enrolled in Medicare part A and part B between January 1, 2012, to December 31, 2019, who were aged >65 years and had an endovascular transfemoral TAVR or SAVR during that period. The index hospitalization for AVR indicated the first time point. We required a minimum of 1 year of continuous enrollment in Medicare before this time point to establish a baseline period to capture covariates. In our main analysis, all patients with SAVR were part of the cohort, including those who had multiple procedures, such as

coronary artery bypass graft, surgical maze procedure, and mitral and tricuspid valve procedures. We repeated the analyses restricted to patients with SAVR with no concomitant procedures ("isolated SAVR"). We also stratified our analyses by elective versus urgent status. For the purpose of this study, an urgent procedure was defined as having the SAVR/TAVR as part of an in-hospital admission as documented by the hospital record.

Study End Points

The primary end point was 30-day mortality with the index date being the procedural date for TAVR or SAVR. Secondary end points included 30-day all-cause readmission from the date of discharge and length of stay from admission to discharge measured in days.

Covariates

Covariates were obtained from the Medicare records and included patient demographics (age, sex, race, and region) and comorbid conditions profile. We captured comorbid profiles using the Elixhauser Comorbidity Index (ECI; Data S1).[10] To further strengthen the prediction models, we measured frailty as determined the Hospital Frailty Risk Score (HFRS), an *International Classification of Diseases, Tenth Revision* (*ICD-10*) claims-based frailty score previously validated in patients with TAVR (Data S1).[11,12]

Statistical Analysis

Patient demographics and ECI were summarized for SAVR and TAVR cohorts. All statistical models controlled for patient demographics and ECI. Each set of models was done for (1) the full cohort and then (2) repeated restricted to isolated SAVR cases and (3) further stratified by elective versus urgent status.

30-Day Mortality

We developed Cox proportional hazard models, which incorporated a 2-way interaction term with index year and TAVR versus SAVR. The dependent variable was time to death. This model allowed us to determine if the relative difference in mortality between TAVR and SAVR changed over time.

30-Day All-Cause Hospital Readmission

We developed cause-specific Cox proportional hazard models to account for the competing risk of death with the exclusion of patients who died during their index admission. Similar to the mortality models, the main covariate was TAVR versus SAVR, with an interaction term for year of procedure to evaluate a temporal effect.

Length of Stay

Length of stay was modeled using a time to event (ie, discharge) model with in-hospital death treated as a competing risk event. The cumulative probability of discharge to home was estimated using the cumulative incidence function and compared by Gray's test. Fine and Gray subdistribution hazard modeling was used to evaluate the effect of TAVR versus SAVR on the adjusted probability of discharge while adjusting for age, sex, and ECI scores. A 2-way interaction term of cohort with index year was included to test whether the probability of discharge for TAVR versus SAVR has changed over time. In interpreting these outputs, a hazard ratio (HR) >1 indicates a shorter time to discharge home.

Effect of AVR Program on Mortality

We developed Cox proportional hazard models with the center included as a random effect to explore the relative mortality impact depending on whether a program performed SAVR only in comparison with a center that offered both TAVR and SAVR. Given that the number of centers performing both SAVR and TAVR procedures increased over time, we conducted this analysis stratified on the index year of the procedure. This was designed to discern if any mortality difference between SAVR and TAVR was restricted to differences in hospital availability of both procedures versus differential temporal improvements in SAVR and TAVR.

Tabulation of summary statistics was performed using the Instant Health Data platform from Boston Health Economics. Models were run using Statistical Analysis Software 9.4, and plots were illustrated in STATA 16. A 2-sided *P* value of <0.05 was considered statistically significant.

RESULTS

A total of 433 849 patients who underwent AVR were recorded in the Medicare fee-for-service payer database from 2012 to 2019, including 245 269 (56.5%) patients with SAVR and 188 580 (43.4%) patients with TAVR. After applying exclusions for patients who were <65 years at the time of index procedure, did not demonstrate continuous 1-year enrollment in Medicare, or lacked documentation of AVR (SAVR, 34 023; TAVR, 8683), the main study cohort included 211 246 patients with SAVR and 179 897 patients with TAVR. The subanalysis cohorts included isolated SAVR (n=95 016) and TAVR and elective isolated SAVR (n=76 079) and elective TAVR (n=147 099; Figure 1).

Baseline Characteristics

In the main cohort, the mean±SD age of the main cohort was 74.3±6.0 years for SAVR and 80.7±6.9 years for TAVR, with women comprising 36.5% and 46.2%,

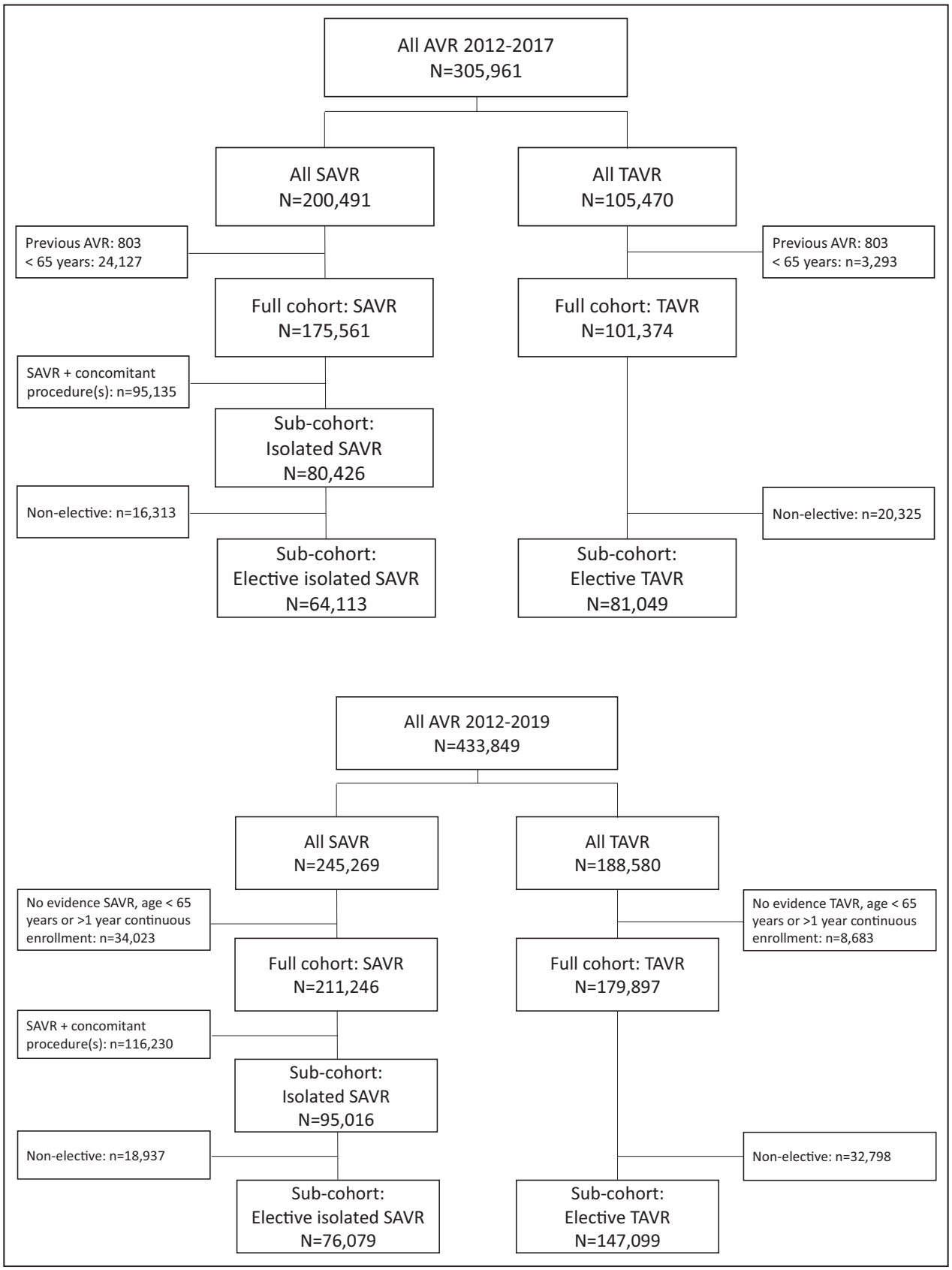

Figure 1. Study cohort (2012–2019; data source: US Medicare Dataset Standard Analytic Files fee-for-service database). AVR indicates aortic valve replacement; SAVR, surgical aortic valve replacement; and TAVR, transcatheter aortic valve replacement.

respectively, and White race for 92.5% and 93.3%, respectively (Table). Patients with SAVR had a mean±SD ECI of 4.4±3.0 and a mean±SD HFRS of 4.8±6.1 (33.5% categorized as frail with HFRS ≥5), whereas patients with TAVR reported a mean±SD ECI score of 6.4±3.6 (55.4% categorized as frail) and a mean±SD HFRS of 8.4±8.6. Similar baseline characteristics were reported for the cohorts of isolated SAVR and TAVR and elective isolated SAVR and elective TAVR (Table S1). Among the patients in the full cohort, an elective admission was recorded for 74.8% of SAVR and 81.8% of TAVR.

Temporal Changes in Procedure Volumes

Total AVR volumes increased 61% from 36 861 in 2012 to 59 357 in 2019. TAVR volumes grew annually, equaled, and then surpassed SAVR in 2016 and 2017, respectively (Figure 2A). The distribution ratio of TAVR versus SAVR changed from 12% in 2012 to 72% in 2019 (Figure 2B).

30-Day Mortality

In the unadjusted model for the main cohort, we found that the 30-day mortality rates decreased from 4.8% to 4.6% for SAVR and from 6.3% to 2.0% for TAVR during the study period (Figure S1). When adjusting for age, sex, ECI, and HFRS, we found a statistically significant temporal effect on the relative efficacy of TAVR versus SAVR (Figure 3). In all of the years, TAVR was associated with a lower mortality rate than SAVR. This relationship was complex and showed a U-shaped curve. Year over year, the magnitude of benefit associated with TAVR increased until 2016, with a HR of 0.76 (95% CI, 0.67–0.86) in 2012 to 0.39 (95% CI, 0.36–0.43) in 2016. Although TAVR continued to have lower mortality rates from 2017 to 2019, the magnitude of benefit over SAVR was attenuated. Analyses of the TAVR versus isolated SAVR and the elective TAVR versus elective isolated SAVR cohorts showed similar results.

30-Day All-Cause Readmission

In the main cohort, year over year, the incidence of unadjusted 30-day all-cause readmission declined for both SAVR (from 18.2% to 13.6%) and TAVR (20.6% to 10.9%; Figure S2). When adjusted for baseline differences,TAVR was associated with a lower risk of all-cause readmission with the magnitude of benefit of TAVR over SAVR varying over time from a HR of 0.68 (95% CI, 0.63–0.73) in 2012 to a low of 0.43 (95% CI,

Table 1. Baseline Characteristics by Study Cohort

	Full cohort			Elective TAVR and elective isolated SAVR	
	SAVR	TAVR	Isolated SAVR	SAVR	TAVR
Total patients	211 246	179 897	95 016	76 079	147 099
Age, mean±SD, y	74.3±6.0	80.7±6.9	73.9±6.0	73.8±5.9	80.6±6.9
Sex, female patient	77 078 (36.5)	83 194 (46.2)	39 874 (42.0)	32 069 (42.2)	67 931 (46.2)
White race	195 409 (92.5)	167 801 (93.3)	87 272 (91.8)	70 485 (92.6)	137 923 (93.8)
Elective procedure	158 053 (74.8)	147 099 (81.8)	76 079 (80.1)	N/A	N/A
Congestive heart failure	58 120 (27.5)	99 102 (55.1)	24 185 (25.5)	18 909 (24.9)	80 585 (54.8)
Cardiac arrhythmia	71 265 (33.7)	90 917 (50.5)	27 103 (28.5)	21 682 (28.5)	74 455 (50.6)
Hypertension*	39 660 (18.8)	79 805 (44.4)	16 179 (17.0)	12 597 (16.6)	64 834 (44.1)
Chronic pulmonary disease	55 017 (26.0)	63 088 (35.1)	24 695 (26.0)	20 000 (26.3)	51 313 (34.9)
Diabetes*	19 198 (9.1)	35 258 (19.6)	7259 (7.6)	5487 (7.2)	28 352 (19.3)
Peripheral vascular disorders	57 083 (27.0)	70 679 (39.3)	26 591 (28.0)	22 636 (29.8)	59 784 (40.6)
Renal failure	31 296 (14.8)	56 842 (31.6)	12 655 (13.3)	9564 (12.6)	45 197 (30.7)
Obesity	30 343 (14.4)	32 607 (18.1)	13 870 (14.6)	11 438 (15.0)	27 104 (18.4)
Liver disease	8144 (3.9)	11 718 (6.5)	3889 (4.1)	3133 (4.1)	9865 (6.7)
Deficiency anemia	14 942 (7.1)	24 261 (13.5)	6366 (6.7)	4629 (6.1)	19 018 (12.9)
Depression	16 814 (8.0)	22 099 (12.3)	7871 (8.3)	6074 (8.0)	17 740 (12.1)
Elixhauser Comorbidity Index	4.4±3.0	6.4±3.6	4.3±2.9	4.4±2.7	6.4±3.5
Hospital Frailty Risk Score	4.8±6.1	8.4±8.6	4.7±6.0	4.4±5.5	8.2±8.3
Frail, Hospital Frailty Risk Score ≥5	70 720 (33.5)	99 740 (55.4)	30 859 (32.5)	23 854 (31.4)	80 657 (54.8)

N/A, not applicable.

Data are provided as number (percentage) or mean±SD. The table highlights the most pertinent comorbidities. Study analyses were conducted with the full complement of the 31 variables included in the Elixhauser Comorbidity Index (Data S1). SAVR indicates surgical aortic valve replacement; and TAVR, transcatheter aortic valve replacement.

*Classified as "complicated."

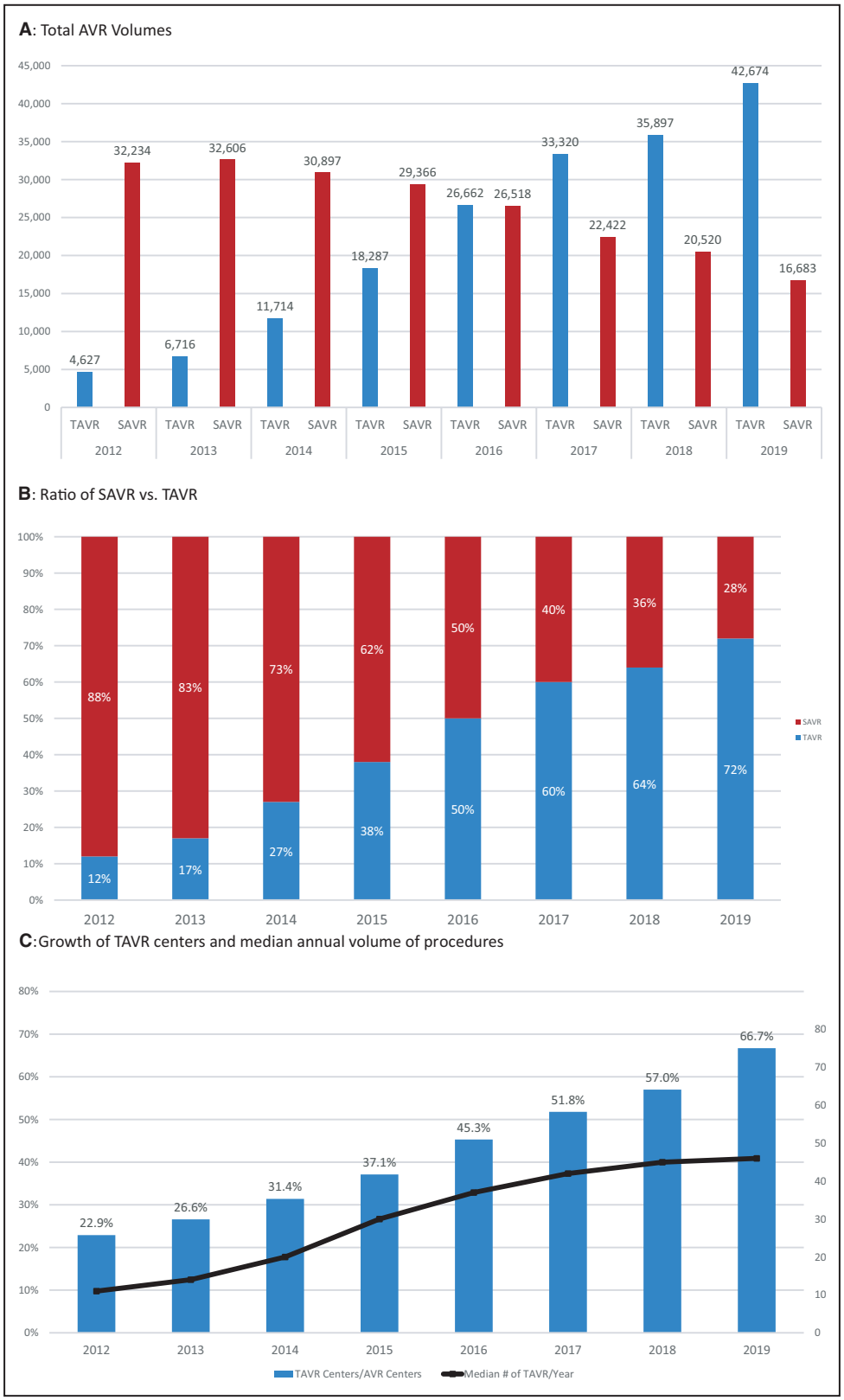

Figure 2. Temporal changes in procedure volumes and availability of TAVR in the United States (2012–2019).

A, Total aortic valve replacement volumes. **B**, Ratio of SAVR vs TAVR. **C**, Growth of TAVR centers and median annual volume of procedures. AVR indicates aortic valve replacement; SAVR, surgical aortic valve replacement; and TAVR, transcatheter aortic valve replacement.

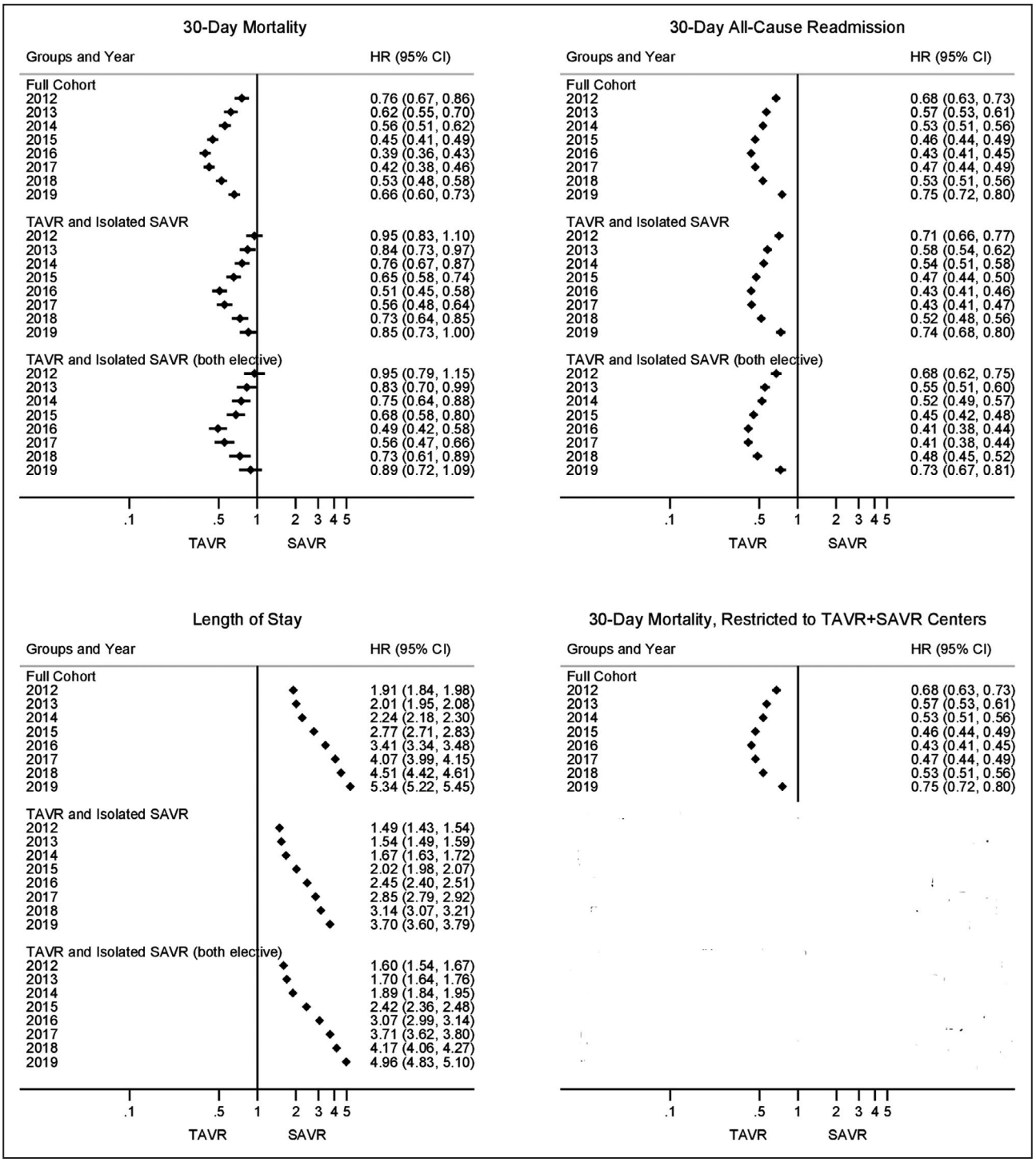

Figure 3. End point analysis—Cox proportional hazard models of time to 30-day mortality and 30-day readmission and Fine and Gray subdistribution models on length of stay (2-way interaction term with index year).
The diamond markers represent the HRs, and the bars indicate the 95% CIs. HR indicates hazard ratio; SAVR, surgical aortic valve replacement; and TAVR, transcatheter aortic valve replacement.

0.41–0.45) in 2016 and increasing to 0.75 (95% CI, 0.72–0.80; Figure 3). A similar trend was seen across the additional isolated SAVR and elective TAVR versus elective isolated SAVR study cohorts.

In-Hospital Length of Stay

In all cohorts, the pattern of temporal change in length of stay was consistent: there were small decreases in SAVR (13.9% decrease in mean length of stay in the

main cohort: 12.2 days in 2012 versus 10.5 in 2019) and larger decreases for TAVR (61.2% decrease in the main cohort: 9.1 days in 2012 versus 3.5 in 2019; Figure S3). When adjusted for covariates and assessed for a temporal effect, a consistent benefit in length of stay was seen favoring TAVR over SAVR, with an increase in the magnitude of this benefit year over year. Specifically, the adjusted HR increased from 1.91 (95% CI, 1.84, 1.98) in 2012 to 5.34 (95% CI, 5.22, 5.45) in 2019 in the main cohort (Figure 3).

Effect of AVR Program on 30-Day Mortality

Over time, the proportion of hospitals that offered both SAVR and TAVR grew from 22.9% (2012, n=258) to 66.7% (2019, n=665), with the median number of TAVR procedures performed increasing from 11 (interquartile range, 4–22) to 46 (interquartile range, 24–77; Figure 2C). When we restricted our 30-day mortality modeling to include only hospitals that performed both TAVR and SAVR, we found a consistent benefit associated with TAVR over SAVR that followed the same U-shaped curve as our primary results (Figure 3).

DISCUSSION

In this retrospective analysis of temporal trends in outcomes after TAVR and SAVR in the United States, we found that over time, there was a complex relationship in terms of degree of improvement in 30-day mortality and readmission and in-hospital length of stay favoring TAVR. To our knowledge, this is the first study to examine changes over time in a large series of real-world patients treated with AVR across multiple centers and during the course of ongoing changes in indications, technology, and clinical care. This study provides novel evidence about the degree and pace of improvement between the 2 treatment options over time as indications, case selection, technology, and clinical pathways continue to evolve. The findings strengthen the evidence that TAVR offers a therapy that continues to rapidly gain an advantage in comparison to the rate of change of SAVR and translates in growing magnitude of benefit across patient groups.

TAVR has experienced significant evolution since 2012. In the early days, TAVR was reserved for the sickest patients, many of whom were ineligible for surgery.[13] Over time, indications expanded to patients who were healthier and case selection was refined to exclude excessively patients unlikely to derive the survival and quality-of-life benefits. Thus, it is not surprising that TAVR outcomes have improved over time. The presence of a U-shape phenomena may indicate that in the most recent years, as mostly at very low surgical risk are undergoing SAVR, there is a narrowing of the gap between the outcomes after SAVR and TAVR.

Technology continues to improve to minimize known complications, including vascular injury, bleeding, paravalvular leak, stroke, and arrhythmias, although ongoing quality improvement efforts remain under way.[14,15] In parallel, there has been a shift to the adoption of a streamlined clinical pathway focused on reducing risks associated with the use of invasive interventions and in-hospital deconditioning and to reduce length of stay.[3,16,17] The adoption of a minimalist approach with a strategy of local anesthesia and/or procedural sedation, the avoidance of invasive monitoring lines, and peri-procedure strategies aimed at increasing the predictability of uncomplicated hemostasis and hemodynamic stability have facilitated the rapid reconditioning of patients with TAVR. The 3M TAVR (Multimodality, Multidisciplinary but Minimalist TAVR) study demonstrated the safety, feasibility, and reproducibility of the Vancouver Clinical Pathway[16] to facilitate a safe next-day discharge home.[18] Other studies have added to this evidence.[19,20] Consequently, many centers have replaced historical clinical practices informed by cardiac surgery protocols in favor of practices better matched to TAVR, patient risks, and contemporary evidence. In contrast, the long-standing excellent outcomes achieved by SAVR centers may not have created similar pressures to scrutinize all aspects of the patients' journey of care to identify opportunities for quality improvement across programs. SAVR programs may continue to report the ceiling effect of the invasiness of surgery that limits the magnitude of possible reductions in length of stay. Advances to surgical protocols, including the use of mini-thoracotomies and robotic and off-pump surgeries, and the implementation of enhanced recovery after surgery pathways continue to yield improved outcomes.[21,22] In our study, we found that 30-day all-cause readmission rates for patients with SAVR followed a similarly robust trend compared with TAVR and decreased from 18.2% in 2012 to 13.6%, indicating improved transitions of care after surgery. Nevertheless, the relative slower rate of improved outcomes seen in SAVR in this study and the resultant growing gap between therapies may reflect missed opportunities to address complications such as the incidence of delirium, surgical site or other infections, and delayed mobilization and discharge that are known to adversely impact the primarily older aortic stenosis population.[23,24]

We found that this temporal observation was consistent, albeit attenuated, when we restricted our analyses to centers that offer both TAVR and SAVR. This is a critical observation as it reinforces 2 key points. First, that even in centers that have both TAVR and SAVR, there was a greater degree of improvement in TAVR outcomes compared with SAVR over time. Second, if a

hospital only offered SAVR, there was an even greater difference in outcomes, as patients who would have received TAVR in other centers were receiving SAVR in that center. This raises further questions about the potential impact of smaller AVR centers that may not offer the full complement of services or may be adversely impacted by low procedural volumes.[25,26]

As such, our study has important implications for promoting patient access to both treatment options and advocating for AVR centers to offer high-quality TAVR and SAVR supported by a coordinated process, a multidisciplinary evaluation pathway and treatment decision, and an embedded adoption of shared decision-making to tailor recommendations to patients' unique risks, values, and priorities.[27,28] Access to both treatment options with surveillance of equity of access[29] and quality of care remains essential. There has been a vigorous health policy debate related to promoting quality of care for TAVR and concerns about volume/outcome relationships.[30,31] Recent analyses of the US TVT (Transcatheter Valve Therapy) Registry reported a significant inverse association between annual transfemoral TAVR volumes and mortality, with hospitals in the lowest volume quartile (mean, 27 procedures) reporting higher and more variable 30-day mortality (3.2%; 95% CI, 2.8–3.7) compared with hospitals in the highest volume quartile (mean, 143 procedures; 30-day mortality, 2.7%; 95% CI, 2.5–2.9).[32] This trend was previously reported in an earlier report[33] and is further supported by evidence that higher volume single operators have superior outcomes.[34] These findings informed the recent US Centers for Medicare & Medicaid Services National Coverage Determination that requires centers to perform ≥20 TAVR/year in addition to meeting other volume, programmatic, and reporting requirements. Similar scrutiny of SAVR has not been similarly intense or debated. The shift to a comprehensive management of patients with aortic stenosis requires the removal of silos that currently separate TAVR and SAVR clinical processes, health policy and funding models, surveillance of access and outcomes, and quality improvement to achieve a more patient-centred and procedure-agnostic approach to disease management.

Additional considerations include the measurement of health status and economic analyses. In low-risk clinical trials, TAVR was associated with better health status than SAVR at 1 month[9,35]; in a recent analysis of very early changes in quality of life in the 3M TAVR study, most patients reported large improvements by 2 weeks after the procedure, with modest additional benefit from 2 weeks to 1 month and sustained improvement through 1 year follow-up as seen in clinical trials.[36] In contrast, among patients undergoing SAVR, deriving quality-of-life benefit requires a longer post-surgical recovery.[37,38] In the context of our study, the inclusion of patient-reported outcomes in treatment recommendation and shared decision-making enables the clinician to convey the best evidence about risks and benefits, whereas the patients can inform their providers about their goals, personal preferences, and values.[28] Similarly, our study findings may further inform the consideration of the economic impact of treatment, as TAVR is projected to be economically dominant by providing greater quality-adjusted life expectancy and lower long-term costs than SAVR, driven in part by the lower health resource requirements and shorter length of stay associated with TAVR.[28] Momentum for the adoption of minimalist procedural approaches have cost-lowering implications for TAVR programs. Ongoing research is needed to integrate a comprehensive evaluation of contemporary practice inclusive of clinician-reported and patient-reported outcomes and health service use.

Limitations

This was a retrospective observational study of site-reported administrative data. Medicare fee for service does not include the full cohort of the Medicare patients with the rate of Medicare Advantage enrollment increasing annually since 2012. Adjustment for patient and procedural factors accounted for reported multiple factors, including frailty; nevertheless, we may not have captured the full complement of determinants of outcomes. The study does not fully account for the diversity of other potentially complex issues such as valve technology, repeat procedures, in-hospital complications, evolving case selection for both SAVR and TAVR, operator and program experience, and variations in reporting. Analyses were limited to early outcomes.

CONCLUSIONS

In this large-scale, real-world report of temporal changes in outcomes in patients treated with AVR, we demonstrated an accelerated improvement of TAVR over SAVR. As indications for TAVR continue to expand, our data highlight opportunities to pursue technological improvements and the implementation of clinical best practices to continue to drive quality improvement. A similar focus on SAVR may offer patients who require a more invasive approach to achieve an optimal outcome.

ARTICLE INFORMATION

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Disclosures

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Supplementary Material

Data S1
Table S1
Figures S1–S3

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SUPPLEMENTAL MATERIAL

DATA S1.

CODING DETAILS

PART 1: Original information provided for Data Source

This analysis used data from the Medicare Dataset Standard Analytic Files (SAFs) 100% fee for service (FFS) database. The Medicare FFS payer database includes information on the healthcare services that are covered for beneficiaries enrolled in Medicare Parts A and B. Data for beneficiaries are available for a given year. Utilization for individual beneficiaries can be linked over time and across providers. Detailed information submitted by providers from claims-data includes, but is not limited to, the following: an encrypted beneficiary identifier and beneficiary responsibility; provider identity; Medicare program payments; from and through dates; admission and discharge dates; information on source of admission and discharge destination (including death) for institutional providers; International Classification of Diseases Ninth Revision (ICD-9) or Tenth Revision (ICD-10) diagnosis and procedure codes; revenue centers, HCPCS/CPT (Healthcare Common Procedure Coding System/Current Procedural Terminology) codes, and charges associated with those services; and annual demographic and enrollment information for all Medicare beneficiaries.

PART 2: Procedure codes for SAVR and TAVR

SAVR Tissue	02RF07Z	02RF08Z	02RF0KZ	02RF47Z	02RF48Z	02RF4KZ
SAVR Mechanical	02RF0JZ	02RF4JZ				
TAVR	02RF37Z 02RF3KZ	02RF38Z	02RF3JZ			

PART 3: Diagnosis Codes for Elixhauser Comorbidity Index (ECI)

ECI CODES	
Congestive Heart Failure	I09.9#, I11.0#, I13.0#, I13.2#, I25.5#, I42.0#, I42.5#, I42.6#, I42.7#, I42.8#, I42.9#, I43.#, I50.#, P29.0#
Cardiac Arrhythmia	I44.1#, I44.2#, I44.3#, I45.6#, I45.9#, I47.#, I48.#, I49.#, R00.0#, R00.1#, R00.8#, T82.1#, Z45.0#, Z95.0#
Valvular Disease	A52.0#, I05.#, I06.#, I07.#, I08.#, I09.1#, I09.8#, I34.#, I35.#, I36.#, I37.#, I38.#, I39.#, Q23.0#, Q23.1#, Q23.2#, Q23.3#, Z95.2#, Z95.4#
Pulmonary Cirulation Disorders	I26.#, I27.#, I28.0#, I28.8#, I28.9#
Peripheral Vascular Disorders	I70.#, I71.#, I73.1#, I73.8#, I73.9#, I77.1#, I79.0#, I79.2#, K55.1#, K55.8#, K55.9#, Z95.8#, Z95.9#
Hypertension (Uncomplicated)	I10.#

ECI CODES	
Hypertension (Complicated)	I11.#, I12.#, I13.#, I15.#
Paralysis	G04.1#, G11.4#, G80.1#, G80.2#, G81.#, G82.#, G83.0#, G83.1#, G83.2#, G83.3#, G83.4#, G83.9#
Other Neurological Disorders	G10.#, G11.#, G12.#, G13.#, G20.#, G21.#, G22.#, G25.4#, G25.5#, G31.2#, G31.8#, G31.9#, G32.#, G35.#, G36.#, G37.#, G40.#, G41.#, G93.1#, G93.4#, R47.0#, R56.#
Chronic Pulmonary Disease	I27.8#, I27.9#, J40.#, J41.#, J42.#, J43.#, J44.#, J45.#, J46.#, J47.#, J60.#, J61.#, J62.#, J63.#, J64.#, J65.#, J66.#, J67.#, J68.4#, J70.1#, J70.3#
Elixhauser Comorbidities	ICD-10 Coding
Diabetes (Uncomplicated)	E10.0#, E10.1#, E10.9#, E11.0#, E11.1#, E11.9#, E12.0#, E12.1#, E12.9#, E13.0#, E13.1#, E13.9#, E14.0#, E14.1#, E14.9#
Diabetes (Comlplicated)	E10.2#, E10.3#, E10.4#, E10.5#, E10.6#, E10.7#, E10.8#, E11.2#, E11.3#, E11.4#, E11.5#, E11.6#, E11.7#, E11.8#, E12.2#, E12.3#, E12.4#, E12.5#, E12.6#, E12.7#, E12.8#, E13.2#, E13.3#, E13.4#, E13.5#, E13.6#, E13.7#, E13.8#, E14.2#, E14.3#, E14.4#, E14.5#, E14.6#, E14.7#, E14.8#
Hypothyroidism	E00.#, E01.#, E02.#, E03.#, E89.0#
Renal Failure	I12.0#, I13.1#, N18.#, NI9.#, N25.0#, Z49.0#, Z49.1#, Z49.2#, Z94.0#, Z99.2#
Liver Disease	B18.#, I85.#, I86.4#, I98.2#, K70.#, K71.1#, K71.3#, K71.4#, K71.5#, K71.7#, K72.#, K73.#, K74.#, K76.0#, K76.2#, K76.3#, K76.4#, K76.5#, K76.6#, K76.7#, K76.8#, K76.9#, Z94.4#
Peptic Ulcer Disease (excluding bleeding)	K25.7#, K25.9#, K26.7#, K26.9#, K27.7#, K27.9#, K28.7#, K28.9#
AIDS/HIV	B20.#, B21.#, B22.#, B24.#
Lymphoma	C81.#, C82.#, C83.#, C84.#, C85.#, C88.#, C96.#, C90.0#, C90.2#
Metastatic Cancer	C77.#, C78.#, C79.#, C80.#

ECI CODES	
Solid Tumor without Metastasis	C0#, C1#, C20.#, C21.#, C22.#, C23.#, C24.#, C25.#, C26.#, C30.#, C31.#, C32.#, C33.#, C34.#, C37.#, C38.#, C39.#, C40.#, C41.#, C43.#, C45.#, C46.#, C47.#, C48.#, C49.#, C50.#, C51.#, C52.#, C53.#, C54.#, C55.#, C56.#, C57.#, C58.#, C6#, C70.#, C71.#, C72.#, C73.#, C74.#, C75.#, C76.#, C97.#
Rheumatoid Arthritis Collagen	L94.0#, L94.1#, L94.3#, M05.#, M06.#, M08.#, M12.0#, M12.3#, M30.#, M31.0#, M31.1#, M31.2#, M31.3#, M32.#, M33.#, M34.#, M35.#, M45.#, M46.1#, M46.8#, M46.9#
Coagulopathy	D65.#, D66.#, D67.#, D68.#, D69.1#, D69.3#, D69.4#, D69.5#, D69.6#
Obesity	E66.#
Weight Loss	E40.#, E41.#, E42.#, E43.#, E44.#, E45.#, E46.#, R63.4#, R64#
Fluid and Electrolyte Disorders	E22.2#, E86.#, E87.#
Blood Loss Anemia	D50.0#
Deficiency Anemia	D50.8#, D50.9#, D51.#, D52.#, D53.#
Alcohol Abuse	F10.#, E52, G62.1#, I42.6, K29.2#, K70.0#, K70.3#, K70.9#, T51.#, Z50.2#, Z71.4#, Z72.1#
Drug Abuse	F11.#, F12.#, F13.#, F14.#, F15.#, F16.#, F18.#, F19.#, Z71.5#, Z72.2#
Psychoses	F20.#, F22.#, F23.#, F24.#, F25.#, F28.#, F29.#, F30.2#, F31.2#, F31.5#
Depression	F20.4#, F31.3#, F31.4#, F31.5#, F32.#, F33.#, F34.1#, F41.2#, F43.2#

Note: The Elixhauser Comorbidity Index was generated using standardized and verified ICD9 and ICD10 codes [Quan, Hude, et al. "Coding algorithms for defining comorbidities in ICD-9-CM and ICD-10 administrative data." *Medical care* (2005): 1130-1139]

PART 4: Diagnosis Codes for Hospital Frailty Risk Score

HFRS CODES	
Abnormal results of function studies	R94.01 R94.02 R94.09 R94.110 R94.111 R94.112 R94.113 R94.118 R94.120 R94.121 R94.128 R94.130 R94.131 R94.138 R94.2 R94.30 R94.31 R94.39 R94.4 R94.5 R94.6 R94.7 R94.8
Abnormalities of gait and mobility	R26.0 R26.1 R26.2 R26.81 R26.89 R26.9
Abnormalities of heartbeat	R00.0 R00.1 R00.2 R00.8 R00.9
Acute renal failure	N17.0 N17.1 N17.2 N17.8 N17.9
Alzheimer's	G30.1 G30.8 G30.9 G30.0
Artificial opening status	Z93.0 Z93.1 Z93.2 Z93.3 Z93.4 Z93.50 Z93.51 Z93.52 Z93.59 Z93.6 Z93.8 Z93.9

HFRS CODES	
Blindness and low vision codes	H54.0X33 H54.0X34 H54.0X35 H54.0X43 H54.0X44 H54.0X45 H54.0X53 H54.0X54 H54.0X55 H54.10 H54.1131 H54.1132 H54.1141 H54.1142 H54.1151 H54.1152 H54.1213 H54.1214 H54.1215 H54.1223 H54.1224 H54.1225 H54.2X11 H54.2X12 H54.2X21 H54.2X22 H54.3 H54.40 H54.413A H54.414A H54.415A H54.42A3 H54.42A4 H54.42A5 H54.50 H54.511A H54.512A H54.52A1 H54.52A2 H54.60 H54.61 H54.62 H54.7 H54.8
Calculus of kidney and ureter	N20.0 N20.1 N20.2 N20.9
Carrier of infectious disease	Z22.0 Z22.1 Z22.2 Z22.31 Z22.321 Z22.322 Z22.330 Z22.338 Z22.39 Z22.4 Z22.6 Z22.7 Z22.8 Z22.9
Cellulitis	L03.011 L03.012 L03.019 L03.021 L03.022 L03.029 L03.031 L03.032 L03.039 L03.041 L03.042 L03.049 L03.111 L03.112 L03.113 L03.114 L03.115 L03.116 L03.119 L03.121 L03.122 L03.123 L03.124 L03.125 L03.126 L03.129 L03.211 L03.212 L03.213 L03.221 L03.222 L03.311 L03.312 L03.313 L03.314 L03.315 L03.316 L03.317 L03.319 L03.321 L03.322 L03.323 L03.324 L03.325 L03.326 L03.327 L03.329 L03.811 L03.818 L03.891 L03.898 L03.90 L03.91
Cerebral Infarction	I63.00 I63.011 I63.012 I63.013 I63.019 I63.02 I63.031 I63.032 I63.033 I63.039 I63.09 I63.10 I63.111 I63.112 I63.113 I63.119 I63.12 I63.131 I63.132 I63.133 I63.139 I63.19 I63.20 I63.211 I63.212 I63.213 I63.219 I63.22 I63.231 I63.232 I63.233 I63.239 I63.29 I63.30 I63.311 I63.312 I63.313 I63.319 I63.321 I63.322 I63.323 I63.329 I63.331 I63.332 I63.333 I63.339 I63.341 I63.342 I63.343 I63.349 I63.39 I63.40 I63.411 I63.412 I63.413 I63.419 I63.421 I63.422 I63.423 I63.429 I63.431 I63.432 I63.433 I63.439 I63.441 I63.442 I63.443 I63.449 I63.49 I63.50 I63.511 I63.512 I63.513 I63.519 I63.521 I63.522 I63.523 I63.529 I63.531 I63.532 I63.533 I63.539 I63.541 I63.542 I63.543 I63.549 I63.59 I63.6 I63.81 I63.89 I63.9
Chronic renal failure	N18.1 N18.2 N18.3 N18.4 N18.5 N18.6 N18.9
Complications of genitourinary prosthetic devices implants and grafts	T83.010A T83.010D T83.010S T83.011A T83.011D T83.011S T83.012A T83.012D T83.012S T83.018A T83.018D T83.018S T83.020A T83.020D T83.020S T83.021A T83.021D T83.021S T83.022A T83.022D T83.022S T83.028A T83.028D T83.028S T83.030A T83.030D T83.030S T83.031A T83.031D T83.031S T83.032A T83.032D T83.032S T83.038A T83.038D T83.038S T83.090A T83.090D T83.090S T83.091A T83.091D T83.091S T83.092A T83.092D T83.092S T83.098A T83.098D T83.098S T83.110A T83.110D T83.110S T83.111A T83.111D T83.111S T83.112A T83.112D T83.112S T83.113A T83.113D T83.113S T83.118A T83.118D T83.118S T83.120A T83.120D T83.120S T83.121A T83.121D T83.121S T83.122A T83.122D T83.122S T83.123A T83.123D T83.123S T83.128A T83.128D T83.128S T83.190A T83.190D T83.190S T83.191A T83.191D T83.191S T83.192A T83.192D T83.192S T83.193A T83.193D T83.193S T83.198A T83.198D T83.198S T83.21XA T83.21XD T83.21XS T83.22XA T83.22XD T83.22XS T83.23XA T83.23XD T83.23XS T83.24XA T83.24XD T83.24XS T83.25XA T83.25XD T83.25XS T83.29XA T83.29XD T83.29XS T83.31XA T83.31XD T83.31XS T83.32XA T83.32XD T83.32XS T83.39XA T83.39XD T83.39XS T83.410A T83.410D T83.410S T83.411A T83.411D T83.411S T83.418A T83.418D T83.418S T83.420A T83.420D T83.420S T83.421A T83.421D T83.421S T83.428A T83.428D T83.428S T83.490A T83.490D T83.490S T83.491A T83.491D T83.491S T83.498A

HFRS CODES	
	T83.498D T83.498S T83.510A T83.510D T83.510S T83.511A T83.511D T83.511S T83.512A T83.512D T83.512S T83.518A T83.518D T83.518S T83.590A T83.590D T83.590S T83.591A T83.591D T83.591S T83.592A T83.592D T83.592S T83.593A T83.593D T83.593S T83.598A T83.598D T83.598S T83.61XA T83.61XD T83.61XS T83.62XA T83.62XD T83.62XS T83.69XA T83.69XD T83.69XS T83.711A T83.711D T83.711S T83.712A T83.712D T83.712S T83.713A T83.713D T83.713S T83.714A T83.714D T83.714S T83.718A T83.718D T83.718S T83.719A T83.719D T83.719S T83.721A T83.721D T83.721S T83.722A T83.722D T83.722S T83.723A T83.723D T83.723S T83.724A T83.724D T83.724S T83.728A T83.728D T83.728S T83.729A T83.729D T83.729S T83.79XA T83.79XD T83.79XS T83.81XA T83.81XD T83.81XS T83.82XA T83.82XD T83.82XS T83.83XA T83.83XD T83.83XS T83.84XA T83.84XD T83.84XS T83.85XA T83.85XD T83.85XS T83.86XA T83.86XD T83.86XS T83.89XA T83.89XD T83.89XS T83.9XXA T83.9XXD T83.9XXS
Convulsions not elsewhere classified	R56.00 R56.01 R56.1 R56.9
Decubitus ulcer	L89.000 L89.001 L89.002 L89.003 L89.004 L89.006 L89.009 L89.010 L89.011 L89.012 L89.013 L89.014 L89.016 L89.019 L89.020 L89.021 L89.022 L89.023 L89.024 L89.026 L89.029 L89.100 L89.101 L89.102 L89.103 L89.104 L89.106 L89.109 L89.110 L89.111 L89.112 L89.113 L89.114 L89.116 L89.119 L89.120 L89.121 L89.122 L89.123 L89.124 L89.126 L89.129 L89.130 L89.131 L89.132 L89.133 L89.134 L89.136 L89.139 L89.140 L89.141 L89.142 L89.143 L89.144 L89.146 L89.149 L89.150 L89.151 L89.152 L89.153 L89.154 L89.156 L89.159 L89.200 L89.201 L89.202 L89.203 L89.204 L89.206 L89.209 L89.210 L89.211 L89.212 L89.213 L89.214 L89.216 L89.219 L89.220 L89.221 L89.222 L89.223 L89.224 L89.226 L89.229 L89.300 L89.301 L89.302 L89.303 L89.304 L89.306 L89.309 L89.310 L89.311 L89.312 L89.313 L89.314 L89.316 L89.319 L89.320 L89.321 L89.322 L89.323 L89.324 L89.326 L89.329 L89.40 L89.41 L89.42 L89.43 L89.44 L89.45 L89.46 L89.500 L89.501 L89.502 L89.503 L89.504 L89.506 L89.509 L89.510 L89.511 L89.512 L89.513 L89.514 L89.516 L89.519 L89.520 L89.521 L89.522 L89.523 L89.524 L89.526 L89.529 L89.600 L89.601 L89.602 L89.603 L89.604 L89.606 L89.609 L89.610 L89.611 L89.612 L89.613 L89.614 L89.616 L89.619 L89.620 L89.621 L89.622 L89.623 L89.624 L89.626 L89.629 L89.810 L89.811 L89.812 L89.813 L89.814 L89.816 L89.819 L89.890 L89.891 L89.892 L89.893 L89.894 L89.896 L89.899 L89.90 L89.91 L89.92 L89.93 L89.94 L89.95 L89.96
Deficiency of other B group vitamins	E53.0 E53.1 E53.8 E53.9
Delirium not induced by alcohol and other psychoactive substances	F05
Dementia	F01.51 F03.90 F03.91 F02.80 F02.81 F01.50
Dependence on enabling machines and devices	Z99.0 Z99.11 Z99.12 Z99.2 Z99.3 Z99.81 Z99.89
Depressive episode	F32.0 F32.1 F32.2 F32.3 F32.4 F32.5 F32.81 F32.89 F32.9
Diarrhea and gastroenteritis of presumed infectious origin	A09
Disorders of mineral metabolism	E83.00 E83.01 E83.09 E83.10 E83.110 E83.111 E83.118 E83.119 E83.19 E83.2 E83.30 E83.31 E83.32 E83.39 E83.40 E83.41 E83.42 E83.49 E83.50 E83.51 E83.52 E83.59 E83.81 E83.89 E83.9

HFRS CODES	
Duodenal ulcer	K26.0 K26.1 K26.2 K26.3 K26.4 K26.5 K26.6 K26.7 K26.9
Dysphagia	R13.0 R13.10 R13.11 R13.12 R13.13 R13.14 R13.19
Epilepsy	G40.001 G40.009 G40.011 G40.019 G40.101 G40.109 G40.111 G40.119 G40.201 G40.209 G40.211 G40.219 G40.301 G40.309 G40.311 G40.319 G40.401 G40.409 G40.411 G40.419 G40.501 G40.509 G40.801 G40.802 G40.803 G40.804 G40.811 G40.812 G40.813 G40.814 G40.821 G40.822 G40.823 G40.824 G40.89 G40.901 G40.909 G40.911 G40.919 G40.A01 G40.A09 G40.A11 G40.A19 G40.B01 G40.B09 G40.B11 G40.B19
Fall involving bed	W06.XXXA W06.XXXD W06.XXXS
Fall on and from stairs and steps	W10.0XXA W10.0XXD W10.0XXS W10.1XXA W10.1XXD W10.1XXS W10.2XXA W10.2XXD W10.2XXS W10.8XXA W10.8XXD W10.8XXS W10.9XXA W10.9XXD W10.9XXS
Fall on same level from slipping tripping and stumbling	W01.0XXA W01.0XXD W01.0XXS W01.10XA W01.10XD W01.10XS W01.110A W01.110D W01.110S W01.111A W01.111D W01.111S W01.118A W01.118D W01.118S W01.119A W01.119D W01.119S W01.190A W01.190D W01.190S W01.198A W01.198D W01.198S
Fever of unknown origin	R50.2 R50.81 R50.82 R50.83 R50.84 R50.9
Fracture of femur	S72.001A S72.001B S72.001C S72.001D S72.001E S72.001F S72.001G S72.001H S72.001J S72.001K S72.001M S72.001N S72.001P S72.001Q S72.001R S72.001S S72.002A S72.002B S72.002C S72.002D S72.002E S72.002F S72.002G S72.002H S72.002J S72.002K S72.002M S72.002N S72.002P S72.002Q S72.002R S72.002S S72.009A S72.009B S72.009C S72.009D S72.009E S72.009F S72.009G S72.009H S72.009J S72.009K S72.009M S72.009N S72.009P S72.009Q S72.009R S72.009S S72.011A S72.011B S72.011C S72.011D S72.011E S72.011F S72.011G S72.011H S72.011J S72.011K S72.011M S72.011N S72.011P S72.011Q S72.011R S72.011S S72.012A S72.012B S72.012C S72.012D S72.012E S72.012F S72.012G S72.012H S72.012J S72.012K S72.012M S72.012N S72.012P S72.012Q S72.012R S72.012S S72.019A S72.019B S72.019C S72.019D S72.019E S72.019F S72.019G S72.019H S72.019J S72.019K S72.019M S72.019N S72.019P S72.019Q S72.019R S72.019S S72.021A S72.021B S72.021C S72.021D S72.021E S72.021F S72.021G S72.021H S72.021J S72.021K S72.021M S72.021N S72.021P S72.021Q S72.021R S72.021S S72.022A S72.022B S72.022C S72.022D S72.022E S72.022F S72.022G S72.022H S72.022J S72.022K S72.022M S72.022N S72.022P S72.022Q S72.022R S72.022S S72.023A S72.023B S72.023C S72.023D S72.023E S72.023F S72.023G S72.023H S72.023J S72.023K S72.023M S72.023N S72.023P S72.023Q S72.023R S72.023S S72.024A S72.024B S72.024C S72.024D S72.024E S72.024F S72.024G S72.024H S72.024J S72.024K S72.024M S72.024N S72.024P S72.024Q S72.024R S72.024S S72.025A S72.025B S72.025C S72.025D S72.025E S72.025F S72.025G S72.025H S72.025J S72.025K S72.025M S72.025N S72.025P S72.025Q S72.025R S72.025S S72.026A S72.026B S72.026C S72.026D S72.026E S72.026F S72.026G S72.026H S72.026J S72.026K S72.026M S72.026N S72.026P S72.026Q S72.026R S72.026S S72.031A S72.031B S72.031C S72.031D S72.031E S72.031F S72.031G S72.031H S72.031J S72.031K S72.031M S72.031N S72.031P

HFRS CODES					
	S72.031Q	S72.031R	S72.031S	S72.032A	S72.032B
	S72.032C	S72.032D	S72.032E	S72.032F	S72.032G
	S72.032H	S72.032J	S72.032K	S72.032M	S72.032N
	S72.032P	S72.032Q	S72.032R	S72.032S	S72.033A
	S72.033B	S72.033C	S72.033D	S72.033E	S72.033F
	S72.033G	S72.033H	S72.033J	S72.033K	S72.033M
	S72.033N	S72.033P	S72.033Q	S72.033R	S72.033S
	S72.034A	S72.034B	S72.034C	S72.034D	S72.034E
	S72.034F	S72.034G	S72.034H	S72.034J	S72.034K
	S72.034M	S72.034N	S72.034P	S72.034Q	S72.034R
	S72.034S	S72.035A	S72.035B	S72.035C	S72.035D
	S72.035E	S72.035F	S72.035G	S72.035H	S72.035J
	S72.035K	S72.035M	S72.035N	S72.035P	S72.035Q
	S72.035R	S72.035S	S72.036A	S72.036B	S72.036C
	S72.036D	S72.036E	S72.036F	S72.036G	S72.036H
	S72.036J	S72.036K	S72.036M	S72.036N	S72.036P
	S72.036Q	S72.036R	S72.036S	S72.041A	S72.041B
	S72.041C	S72.041D	S72.041E	S72.041F	S72.041G
	S72.041H	S72.041J	S72.041K	S72.041M	S72.041N
	S72.041P	S72.041Q	S72.041R	S72.041S	S72.042A
	S72.042B	S72.042C	S72.042D	S72.042E	S72.042F
	S72.042G	S72.042H	S72.042J	S72.042K	S72.042M
	S72.042N	S72.042P	S72.042Q	S72.042R	S72.042S
	S72.043A	S72.043B	S72.043C	S72.043D	S72.043E
	S72.043F	S72.043G	S72.043H	S72.043J	S72.043K
	S72.043M	S72.043N	S72.043P	S72.043Q	S72.043R
	S72.043S	S72.044A	S72.044B	S72.044C	S72.044D
	S72.044E	S72.044F	S72.044G	S72.044H	S72.044J
	S72.044K	S72.044M	S72.044N	S72.044P	S72.044Q
	S72.044R	S72.044S	S72.045A	S72.045B	S72.045C
	S72.045D	S72.045E	S72.045F	S72.045G	S72.045H
	S72.045J	S72.045K	S72.045M	S72.045N	S72.045P
	S72.045Q	S72.045R	S72.045S	S72.046A	S72.046B
	S72.046C	S72.046D	S72.046E	S72.046F	S72.046G
	S72.046H	S72.046J	S72.046K	S72.046M	S72.046N
	S72.046P	S72.046Q	S72.046R	S72.046S	S72.051A
	S72.051B	S72.051C	S72.051D	S72.051E	S72.051F
	S72.051G	S72.051H	S72.051J	S72.051K	S72.051M
	S72.051N	S72.051P	S72.051Q	S72.051R	S72.051S
	S72.052A	S72.052B	S72.052C	S72.052D	S72.052E
	S72.052F	S72.052G	S72.052H	S72.052J	S72.052K
	S72.052M	S72.052N	S72.052P	S72.052Q	S72.052R
	S72.052S	S72.059A	S72.059B	S72.059C	S72.059D
	S72.059E	S72.059F	S72.059G	S72.059H	S72.059J
	S72.059K	S72.059M	S72.059N	S72.059P	S72.059Q
	S72.059R	S72.059S	S72.061A	S72.061B	S72.061C
	S72.061D	S72.061E	S72.061F	S72.061G	S72.061H
	S72.061J	S72.061K	S72.061M	S72.061N	S72.061P
	S72.061Q	S72.061R	S72.061S	S72.062A	S72.062B
	S72.062C	S72.062D	S72.062E	S72.062F	S72.062G
	S72.062H	S72.062J	S72.062K	S72.062M	S72.062N
	S72.062P	S72.062Q	S72.062R	S72.062S	S72.063A
	S72.063B	S72.063C	S72.063D	S72.063E	S72.063F
	S72.063G	S72.063H	S72.063J	S72.063K	S72.063M
	S72.063N	S72.063P	S72.063Q	S72.063R	S72.063S
	S72.064A	S72.064B	S72.064C	S72.064D	S72.064E
	S72.064F	S72.064G	S72.064H	S72.064J	S72.064K
	S72.064M	S72.064N	S72.064P	S72.064Q	S72.064R
	S72.064S	S72.065A	S72.065B	S72.065C	S72.065D
	S72.065E	S72.065F	S72.065G	S72.065H	S72.065J

HFRS CODES					
	S72.065K	S72.065M	S72.065N	S72.065P	S72.065Q
	S72.065R	S72.065S	S72.066A	S72.066B	S72.066C
	S72.066D	S72.066E	S72.066F	S72.066G	S72.066H
	S72.066J	S72.066K	S72.066M	S72.066N	S72.066P
	S72.066Q	S72.066R	S72.066S	S72.091A	S72.091B
	S72.091C	S72.091D	S72.091E	S72.091F	S72.091G
	S72.091H	S72.091J	S72.091K	S72.091M	S72.091N
	S72.091P	S72.091Q	S72.091R	S72.091S	S72.092A
	S72.092B	S72.092C	S72.092D	S72.092E	S72.092F
	S72.092G	S72.092H	S72.092J	S72.092K	S72.092M
	S72.092N	S72.092P	S72.092Q	S72.092R	S72.092S
	S72.099A	S72.099B	S72.099C	S72.099D	S72.099E
	S72.099F	S72.099G	S72.099H	S72.099J	S72.099K
	S72.099M	S72.099N	S72.099P	S72.099Q	S72.099R
	S72.099S	S72.101A	S72.101B	S72.101C	S72.101D
	S72.101E	S72.101F	S72.101G	S72.101H	S72.101J
	S72.101K	S72.101M	S72.101N	S72.101P	S72.101Q
	S72.101R	S72.101S	S72.102A	S72.102B	S72.102C
	S72.102D	S72.102E	S72.102F	S72.102G	S72.102H
	S72.102J	S72.102K	S72.102M	S72.102N	S72.102P
	S72.102Q	S72.102R	S72.102S	S72.109A	S72.109B
	S72.109C	S72.109D	S72.109E	S72.109F	S72.109G
	S72.109H	S72.109J	S72.109K	S72.109M	S72.109N
	S72.109P	S72.109Q	S72.109R	S72.109S	S72.111A
	S72.111B	S72.111C	S72.111D	S72.111E	S72.111F
	S72.111G	S72.111H	S72.111J	S72.111K	S72.111M
	S72.111N	S72.111P	S72.111Q	S72.111R	S72.111S
	S72.112A	S72.112B	S72.112C	S72.112D	S72.112E
	S72.112F	S72.112G	S72.112H	S72.112J	S72.112K
	S72.112M	S72.112N	S72.112P	S72.112Q	S72.112R
	S72.112S	S72.113A	S72.113B	S72.113C	S72.113D
	S72.113E	S72.113F	S72.113G	S72.113H	S72.113J
	S72.113K	S72.113M	S72.113N	S72.113P	S72.113Q
	S72.113R	S72.113S	S72.114A	S72.114B	S72.114C
	S72.114D	S72.114E	S72.114F	S72.114G	S72.114H
	S72.114J	S72.114K	S72.114M	S72.114N	S72.114P
	S72.114Q	S72.114R	S72.114S	S72.115A	S72.115B
	S72.115C	S72.115D	S72.115E	S72.115F	S72.115G
	S72.115H	S72.115J	S72.115K	S72.115M	S72.115N
	S72.115P	S72.115Q	S72.115R	S72.115S	S72.116A
	S72.116B	S72.116C	S72.116D	S72.116E	S72.116F
	S72.116G	S72.116H	S72.116J	S72.116K	S72.116M
	S72.116N	S72.116P	S72.116Q	S72.116R	S72.116S
	S72.121A	S72.121B	S72.121C	S72.121D	S72.121E
	S72.121F	S72.121G	S72.121H	S72.121J	S72.121K
	S72.121M	S72.121N	S72.121P	S72.121Q	S72.121R
	S72.121S	S72.122A	S72.122B	S72.122C	S72.122D
	S72.122E	S72.122F	S72.122G	S72.122H	S72.122J
	S72.122K	S72.122M	S72.122N	S72.122P	S72.122Q
	S72.122R	S72.122S	S72.123A	S72.123B	S72.123C
	S72.123D	S72.123E	S72.123F	S72.123G	S72.123H
	S72.123J	S72.123K	S72.123M	S72.123N	S72.123P
	S72.123Q	S72.123R	S72.123S	S72.124A	S72.124B
	S72.124C	S72.124D	S72.124E	S72.124F	S72.124G
	S72.124H	S72.124J	S72.124K	S72.124M	S72.124N
	S72.124P	S72.124Q	S72.124R	S72.124S	S72.125A
	S72.125B	S72.125C	S72.125D	S72.125E	S72.125F
	S72.125G	S72.125H	S72.125J	S72.125K	S72.125M
	S72.125N	S72.125P	S72.125Q	S72.125R	S72.125S
	S72.126A	S72.126B	S72.126C	S72.126D	S72.126E

HFRS CODES					
	S72.126F	S72.126G	S72.126H	S72.126J	S72.126K
	S72.126M	S72.126N	S72.126P	S72.126Q	S72.126R
	S72.126S	S72.131A	S72.131B	S72.131C	S72.131D
	S72.131E	S72.131F	S72.131G	S72.131H	S72.131J
	S72.131K	S72.131M	S72.131N	S72.131P	S72.131Q
	S72.131R	S72.131S	S72.132A	S72.132B	S72.132C
	S72.132D	S72.132E	S72.132F	S72.132G	S72.132H
	S72.132J	S72.132K	S72.132M	S72.132N	S72.132P
	S72.132Q	S72.132R	S72.132S	S72.133A	S72.133B
	S72.133C	S72.133D	S72.133E	S72.133F	S72.133G
	S72.133H	S72.133J	S72.133K	S72.133M	S72.133N
	S72.133P	S72.133Q	S72.133R	S72.133S	S72.134A
	S72.134B	S72.134C	S72.134D	S72.134E	S72.134F
	S72.134G	S72.134H	S72.134J	S72.134K	S72.134M
	S72.134N	S72.134P	S72.134Q	S72.134R	S72.134S
	S72.135A	S72.135B	S72.135C	S72.135D	S72.135E
	S72.135F	S72.135G	S72.135H	S72.135J	S72.135K
	S72.135M	S72.135N	S72.135P	S72.135Q	S72.135R
	S72.135S	S72.136A	S72.136B	S72.136C	S72.136D
	S72.136E	S72.136F	S72.136G	S72.136H	S72.136J
	S72.136K	S72.136M	S72.136N	S72.136P	S72.136Q
	S72.136R	S72.136S	S72.141A	S72.141B	S72.141C
	S72.141D	S72.141E	S72.141F	S72.141G	S72.141H
	S72.141J	S72.141K	S72.141M	S72.141N	S72.141P
	S72.141Q	S72.141R	S72.141S	S72.142A	S72.142B
	S72.142C	S72.142D	S72.142E	S72.142F	S72.142G
	S72.142H	S72.142J	S72.142K	S72.142M	S72.142N
	S72.142P	S72.142Q	S72.142R	S72.142S	S72.143A
	S72.143B	S72.143C	S72.143D	S72.143E	S72.143F
	S72.143G	S72.143H	S72.143J	S72.143K	S72.143M
	S72.143N	S72.143P	S72.143Q	S72.143R	S72.143S
	S72.144A	S72.144B	S72.144C	S72.144D	S72.144E
	S72.144F	S72.144G	S72.144H	S72.144J	S72.144K
	S72.144M	S72.144N	S72.144P	S72.144Q	S72.144R
	S72.144S	S72.145A	S72.145B	S72.145C	S72.145D
	S72.145E	S72.145F	S72.145G	S72.145H	S72.145J
	S72.145K	S72.145M	S72.145N	S72.145P	S72.145Q
	S72.145R	S72.145S	S72.146A	S72.146B	S72.146C
	S72.146D	S72.146E	S72.146F	S72.146G	S72.146H
Fracture of lumbar spine and pelvis	S32.000A	S32.000B	S32.000D	S32.000G	S32.000K
	S32.000S	S32.001A	S32.001B	S32.001D	S32.001G
	S32.001K	S32.001S	S32.002A	S32.002B	S32.002D
	S32.002G	S32.002K	S32.002S	S32.008A	S32.008B
	S32.008D	S32.008G	S32.008K	S32.008S	S32.009A
	S32.009B	S32.009D	S32.009G	S32.009K	S32.009S
	S32.010A	S32.010B	S32.010D	S32.010G	S32.010K
	S32.010S	S32.011A	S32.011B	S32.011D	S32.011G
	S32.011K	S32.011S	S32.012A	S32.012B	S32.012D
	S32.012G	S32.012K	S32.012S	S32.018A	S32.018B
	S32.018D	S32.018G	S32.018K	S32.018S	S32.019A
	S32.019B	S32.019D	S32.019G	S32.019K	S32.019S
	S32.020A	S32.020B	S32.020D	S32.020G	S32.020K
	S32.020S	S32.021A	S32.021B	S32.021D	S32.021G
	S32.021K	S32.021S	S32.022A	S32.022B	S32.022D
	S32.022G	S32.022K	S32.022S	S32.028A	S32.028B
	S32.028D	S32.028G	S32.028K	S32.028S	S32.029A
	S32.029B	S32.029D	S32.029G	S32.029K	S32.029S
	S32.030A	S32.030B	S32.030D	S32.030G	S32.030K
	S32.030S	S32.031A	S32.031B	S32.031D	S32.031G
	S32.031K	S32.031S	S32.032A	S32.032B	S32.032D

HFRS CODES					
	S32.032G	S32.032K	S32.032S	S32.038A	S32.038B
	S32.038D	S32.038G	S32.038K	S32.038S	S32.039A
	S32.039B	S32.039D	S32.039G	S32.039K	S32.039S
	S32.040A	S32.040B	S32.040D	S32.040G	S32.040K
	S32.040S	S32.041A	S32.041B	S32.041D	S32.041G
	S32.041K	S32.041S	S32.042A	S32.042B	S32.042D
	S32.042G	S32.042K	S32.042S	S32.048A	S32.048B
	S32.048D	S32.048G	S32.048K	S32.048S	S32.049A
	S32.049B	S32.049D	S32.049G	S32.049K	S32.049S
	S32.050A	S32.050B	S32.050D	S32.050G	S32.050K
	S32.050S	S32.051A	S32.051B	S32.051D	S32.051G
	S32.051K	S32.051S	S32.052A	S32.052B	S32.052D
	S32.052G	S32.052K	S32.052S	S32.058A	S32.058B
	S32.058D	S32.058G	S32.058K	S32.058S	S32.059A
	S32.059B	S32.059D	S32.059G	S32.059K	S32.059S
	S32.10XA	S32.10XB	S32.10XD	S32.10XG	S32.10XK
	S32.10XS	S32.110A	S32.110B	S32.110D	S32.110G
	S32.110K	S32.110S	S32.111A	S32.111B	S32.111D
	S32.111G	S32.111K	S32.111S	S32.112A	S32.112B
	S32.112D	S32.112G	S32.112K	S32.112S	S32.119A
	S32.119B	S32.119D	S32.119G	S32.119K	S32.119S
	S32.120A	S32.120B	S32.120D	S32.120G	S32.120K
	S32.120S	S32.121A	S32.121B	S32.121D	S32.121G
	S32.121K	S32.121S	S32.122A	S32.122B	S32.122D
	S32.122G	S32.122K	S32.122S	S32.129A	S32.129B
	S32.129D	S32.129G	S32.129K	S32.129S	S32.130A
	S32.130B	S32.130D	S32.130G	S32.130K	S32.130S
	S32.131A	S32.131B	S32.131D	S32.131G	S32.131K
	S32.131S	S32.132A	S32.132B	S32.132D	S32.132G
	S32.132K	S32.132S	S32.139A	S32.139B	S32.139D
	S32.139G	S32.139K	S32.139S	S32.14XA	S32.14XB
	S32.14XD	S32.14XG	S32.14XK	S32.14XS	S32.15XA
	S32.15XB	S32.15XD	S32.15XG	S32.15XK	S32.15XS
	S32.16XA	S32.16XB	S32.16XD	S32.16XG	S32.16XK
	S32.16XS	S32.17XA	S32.17XB	S32.17XD	S32.17XG
	S32.17XK	S32.17XS	S32.19XA	S32.19XB	S32.19XD
	S32.19XG	S32.19XK	S32.19XS	S32.2XXA	S32.2XXB
	S32.2XXD	S32.2XXG	S32.2XXK	S32.2XXS	S32.301A
	S32.301B	S32.301D	S32.301G	S32.301K	S32.301S
	S32.302A	S32.302B	S32.302D	S32.302G	S32.302K
	S32.302S	S32.309A	S32.309B	S32.309D	S32.309G
	S32.309K	S32.309S	S32.311A	S32.311B	S32.311D
	S32.311G	S32.311K	S32.311S	S32.312A	S32.312B
	S32.312D	S32.312G	S32.312K	S32.312S	S32.313A
	S32.313B	S32.313D	S32.313G	S32.313K	S32.313S
	S32.314A	S32.314B	S32.314D	S32.314G	S32.314K
	S32.314S	S32.315A	S32.315B	S32.315D	S32.315G
	S32.315K	S32.315S	S32.316A	S32.316B	S32.316D
	S32.316G	S32.316K	S32.316S	S32.391A	S32.391B
	S32.391D	S32.391G	S32.391K	S32.391S	S32.392A
	S32.392B	S32.392D	S32.392G	S32.392K	S32.392S
	S32.399A	S32.399B	S32.399D	S32.399G	S32.399K
	S32.399S	S32.401A	S32.401B	S32.401D	S32.401G
	S32.401K	S32.401S	S32.402A	S32.402B	S32.402D
	S32.402G	S32.402K	S32.402S	S32.409A	S32.409B
	S32.409D	S32.409G	S32.409K	S32.409S	S32.411A
	S32.411B	S32.411D	S32.411G	S32.411K	S32.411S
	S32.412A	S32.412B	S32.412D	S32.412G	S32.412K
	S32.412S	S32.413A	S32.413B	S32.413D	S32.413G
	S32.413K	S32.413S	S32.414A	S32.414B	S32.414D

HFRS CODES					
	S32.414G	S32.414K	S32.414S	S32.415A	S32.415B
	S32.415D	S32.415G	S32.415K	S32.415S	S32.416A
	S32.416B	S32.416D	S32.416G	S32.416K	S32.416S
	S32.421A	S32.421B	S32.421D	S32.421G	S32.421K
	S32.421S	S32.422A	S32.422B	S32.422D	S32.422G
	S32.422K	S32.422S	S32.423A	S32.423B	S32.423D
	S32.423G	S32.423K	S32.423S	S32.424A	S32.424B
	S32.424D	S32.424G	S32.424K	S32.424S	S32.425A
	S32.425B	S32.425D	S32.425G	S32.425K	S32.425S
	S32.426A	S32.426B	S32.426D	S32.426G	S32.426K
	S32.426S	S32.431A	S32.431B	S32.431D	S32.431G
	S32.431K	S32.431S	S32.432A	S32.432B	S32.432D
	S32.432G	S32.432K	S32.432S	S32.433A	S32.433B
	S32.433D	S32.433G	S32.433K	S32.433S	S32.434A
	S32.434B	S32.434D	S32.434G	S32.434K	S32.434S
	S32.435A	S32.435B	S32.435D	S32.435G	S32.435K
	S32.435S	S32.436A	S32.436B	S32.436D	S32.436G
	S32.436K	S32.436S	S32.441A	S32.441B	S32.441D
	S32.441G	S32.441K	S32.441S	S32.442A	S32.442B
	S32.442D	S32.442G	S32.442K	S32.442S	S32.443A
	S32.443B	S32.443D	S32.443G	S32.443K	S32.443S
	S32.444A	S32.444B	S32.444D	S32.444G	S32.444K
	S32.444S	S32.445A	S32.445B	S32.445D	S32.445G
	S32.445K	S32.445S	S32.446A	S32.446B	S32.446D
	S32.446G	S32.446K	S32.446S	S32.451A	S32.451B
	S32.451D	S32.451G	S32.451K	S32.451S	S32.452A
	S32.452B	S32.452D	S32.452G	S32.452K	S32.452S
	S32.453A	S32.453B	S32.453D	S32.453G	S32.453K
	S32.453S	S32.454A	S32.454B	S32.454D	S32.454G
	S32.454K	S32.454S	S32.455A	S32.455B	S32.455D
	S32.455G	S32.455K	S32.455S	S32.456A	S32.456B
	S32.456D	S32.456G	S32.456K	S32.456S	S32.461A
	S32.461B	S32.461D	S32.461G	S32.461K	S32.461S
	S32.462A	S32.462B	S32.462D	S32.462G	S32.462K
	S32.462S	S32.463A	S32.463B	S32.463D	S32.463G
	S32.463K	S32.463S	S32.464A	S32.464B	S32.464D
	S32.464G	S32.464K	S32.464S	S32.465A	S32.465B
	S32.465D	S32.465G	S32.465K	S32.465S	S32.466A
	S32.466B	S32.466D	S32.466G	S32.466K	S32.466S
	S32.471A	S32.471B	S32.471D	S32.471G	S32.471K
	S32.471S	S32.472A	S32.472B	S32.472D	S32.472G
	S32.472K	S32.472S	S32.473A	S32.473B	S32.473D
	S32.473G	S32.473K	S32.473S	S32.474A	S32.474B
	S32.474D	S32.474G	S32.474K	S32.474S	S32.475A
	S32.475B	S32.475D	S32.475G	S32.475K	S32.475S
	S32.476A	S32.476B	S32.476D	S32.476G	S32.476K
	S32.476S	S32.481A	S32.481B	S32.481D	S32.481G
	S32.481K	S32.481S	S32.482A	S32.482B	S32.482D
	S32.482G	S32.482K	S32.482S	S32.483A	S32.483B
	S32.483D	S32.483G	S32.483K	S32.483S	S32.484A
	S32.484B	S32.484D	S32.484G	S32.484K	S32.484S
	S32.485A	S32.485B	S32.485D	S32.485G	S32.485K
	S32.485S	S32.486A	S32.486B	S32.486D	S32.486G
	S32.486K	S32.486S	S32.491A	S32.491B	S32.491D
	S32.491G	S32.491K	S32.491S	S32.492A	S32.492B
	S32.492D	S32.492G	S32.492K	S32.492S	S32.499A
	S32.499B	S32.499D	S32.499G	S32.499K	S32.499S
	S32.501A	S32.501B	S32.501D	S32.501G	S32.501K
	S32.501S	S32.502A	S32.502B	S32.502D	S32.502G
	S32.502K	S32.502S	S32.509A	S32.509B	S32.509D

HFRS CODES					
	S32.509G	S32.509K	S32.509S	S32.511A	S32.511B
	S32.511D	S32.511G	S32.511K	S32.511S	S32.512A
	S32.512B	S32.512D	S32.512G	S32.512K	S32.512S
	S32.519A	S32.519B	S32.519D	S32.519G	S32.519K
	S32.519S	S32.591A	S32.591B	S32.591D	S32.591G
	S32.591K	S32.591S	S32.592A	S32.592B	S32.592D
	S32.592G	S32.592K	S32.592S	S32.599A	S32.599B
	S32.599D	S32.599G	S32.599K	S32.599S	S32.601A
	S32.601B	S32.601D	S32.601G	S32.601K	S32.601S
	S32.602A	S32.602B	S32.602D	S32.602G	S32.602K
	S32.602S	S32.609A	S32.609B	S32.609D	S32.609G
	S32.609K	S32.609S	S32.611A	S32.611B	S32.611D
	S32.611G	S32.611K	S32.611S	S32.612A	S32.612B
	S32.612D	S32.612G	S32.612K	S32.612S	S32.613A
	S32.613B	S32.613D	S32.613G	S32.613K	S32.613S
	S32.614A	S32.614B	S32.614D	S32.614G	S32.614K
	S32.614S	S32.615A	S32.615B	S32.615D	S32.615G
	S32.615K	S32.615S	S32.616A	S32.616B	S32.616D
	S32.616G	S32.616K	S32.616S	S32.691A	S32.691B
	S32.691D	S32.691G	S32.691K	S32.691S	S32.692A
	S32.692B	S32.692D	S32.692G	S32.692K	S32.692S
	S32.699A	S32.699B	S32.699D	S32.699G	S32.699K
	S32.699S	S32.810A	S32.810B	S32.810D	S32.810G
	S32.810K	S32.810S	S32.811A	S32.811B	S32.811D
	S32.811G	S32.811K	S32.811S	S32.82XA	S32.82XB
	S32.82XD	S32.82XG	S32.82XK	S32.82XS	S32.89XA
	S32.89XB	S32.89XD	S32.89XG	S32.89XK	S32.89XS
	S32.9XXA	S32.9XXB	S32.9XXD	S32.9XXG	S32.9XXK
	S32.9XXS				
Fracture of rib(s) sternum and thoracic spine	S22.000A	S22.000B	S22.000D	S22.000G	S22.000K
	S22.000S	S22.001A	S22.001B	S22.001D	S22.001G
	S22.001K	S22.001S	S22.002A	S22.002B	S22.002D
	S22.002G	S22.002K	S22.002S	S22.008A	S22.008B
	S22.008D	S22.008G	S22.008K	S22.008S	S22.009A
	S22.009B	S22.009D	S22.009G	S22.009K	S22.009S
	S22.010A	S22.010B	S22.010D	S22.010G	S22.010K
	S22.010S	S22.011A	S22.011B	S22.011D	S22.011G
	S22.011K	S22.011S	S22.012A	S22.012B	S22.012D
	S22.012G	S22.012K	S22.012S	S22.018A	S22.018B
	S22.018D	S22.018G	S22.018K	S22.018S	S22.019A
	S22.019B	S22.019D	S22.019G	S22.019K	S22.019S
	S22.020A	S22.020B	S22.020D	S22.020G	S22.020K
	S22.020S	S22.021A	S22.021B	S22.021D	S22.021G
	S22.021K	S22.021S	S22.022A	S22.022B	S22.022D
	S22.022G	S22.022K	S22.022S	S22.028A	S22.028B
	S22.028D	S22.028G	S22.028K	S22.028S	S22.029A
	S22.029B	S22.029D	S22.029G	S22.029K	S22.029S
	S22.030A	S22.030B	S22.030D	S22.030G	S22.030K
	S22.030S	S22.031A	S22.031B	S22.031D	S22.031G
	S22.031K	S22.031S	S22.032A	S22.032B	S22.032D
	S22.032G	S22.032K	S22.032S	S22.038A	S22.038B
	S22.038D	S22.038G	S22.038K	S22.038S	S22.039A
	S22.039B	S22.039D	S22.039G	S22.039K	S22.039S
	S22.040A	S22.040B	S22.040D	S22.040G	S22.040K
	S22.040S	S22.041A	S22.041B	S22.041D	S22.041G
	S22.041K	S22.041S	S22.042A	S22.042B	S22.042D
	S22.042G	S22.042K	S22.042S	S22.048A	S22.048B
	S22.048D	S22.048G	S22.048K	S22.048S	S22.049A
	S22.049B	S22.049D	S22.049G	S22.049K	S22.049S
	S22.050A	S22.050B	S22.050D	S22.050G	S22.050K

HFRS CODES					
	S22.050S	S22.051A	S22.051B	S22.051D	S22.051G
	S22.051K	S22.051S	S22.052A	S22.052B	S22.052D
	S22.052G	S22.052K	S22.052S	S22.058A	S22.058B
	S22.058D	S22.058G	S22.058K	S22.058S	S22.059A
	S22.059B	S22.059D	S22.059G	S22.059K	S22.059S
	S22.060A	S22.060B	S22.060D	S22.060G	S22.060K
	S22.060S	S22.061A	S22.061B	S22.061D	S22.061G
	S22.061K	S22.061S	S22.062A	S22.062B	S22.062D
	S22.062G	S22.062K	S22.062S	S22.068A	S22.068B
	S22.068D	S22.068G	S22.068K	S22.068S	S22.069A
	S22.069B	S22.069D	S22.069G	S22.069K	S22.069S
	S22.070A	S22.070B	S22.070D	S22.070G	S22.070K
	S22.070S	S22.071A	S22.071B	S22.071D	S22.071G
	S22.071K	S22.071S	S22.072A	S22.072B	S22.072D
	S22.072G	S22.072K	S22.072S	S22.078A	S22.078B
	S22.078D	S22.078G	S22.078K	S22.078S	S22.079A
	S22.079B	S22.079D	S22.079G	S22.079K	S22.079S
	S22.080A	S22.080B	S22.080D	S22.080G	S22.080K
	S22.080S	S22.081A	S22.081B	S22.081D	S22.081G
	S22.081K	S22.081S	S22.082A	S22.082B	S22.082D
	S22.082G	S22.082K	S22.082S	S22.088A	S22.088B
	S22.088D	S22.088G	S22.088K	S22.088S	S22.089A
	S22.089B	S22.089D	S22.089G	S22.089K	S22.089S
	S22.20XA	S22.20XB	S22.20XD	S22.20XG	S22.20XK
	S22.20XS	S22.21XA	S22.21XB	S22.21XD	S22.21XG
	S22.21XK	S22.21XS	S22.22XA	S22.22XB	S22.22XD
	S22.22XG	S22.22XK	S22.22XS	S22.23XA	S22.23XB
	S22.23XD	S22.23XG	S22.23XK	S22.23XS	S22.24XA
	S22.24XB	S22.24XD	S22.24XG	S22.24XK	S22.24XS
	S22.31XA	S22.31XB	S22.31XD	S22.31XG	S22.31XK
	S22.31XS	S22.32XA	S22.32XB	S22.32XD	S22.32XG
	S22.32XK	S22.32XS	S22.39XA	S22.39XB	S22.39XD
	S22.39XG	S22.39XK	S22.39XS	S22.41XA	S22.41XB
	S22.41XD	S22.41XG	S22.41XK	S22.41XS	S22.42XA
	S22.42XB	S22.42XD	S22.42XG	S22.42XK	S22.42XS
	S22.43XA	S22.43XB	S22.43XD	S22.43XG	S22.43XK
	S22.43XS	S22.49XA	S22.49XB	S22.49XD	S22.49XG
	S22.49XK	S22.49XS	S22.5XXA	S22.5XXB	S22.5XXD
	S22.5XXG	S22.5XXK	S22.5XXS	S22.9XXA	S22.9XXB
	S22.9XXD	S22.9XXG	S22.9XXK	S22.9XXS	
Fracture of shoulder and upper arm	S42.001A	S42.001B	S42.001D	S42.001G	S42.001K
	S42.001P	S42.001S	S42.002A	S42.002B	S42.002D
	S42.002G	S42.002K	S42.002P	S42.002S	S42.009A
	S42.009B	S42.009D	S42.009G	S42.009K	S42.009P
	S42.009S	S42.011A	S42.011B	S42.011D	S42.011G
	S42.011K	S42.011P	S42.011S	S42.012A	S42.012B
	S42.012D	S42.012G	S42.012K	S42.012P	S42.012S
	S42.013A	S42.013B	S42.013D	S42.013G	S42.013K
	S42.013P	S42.013S	S42.014A	S42.014B	S42.014D
	S42.014G	S42.014K	S42.014P	S42.014S	S42.015A
	S42.015B	S42.015D	S42.015G	S42.015K	S42.015P
	S42.015S	S42.016A	S42.016B	S42.016D	S42.016G
	S42.016K	S42.016P	S42.016S	S42.017A	S42.017B
	S42.017D	S42.017G	S42.017K	S42.017P	S42.017S
	S42.018A	S42.018B	S42.018D	S42.018G	S42.018K
	S42.018P	S42.018S	S42.019A	S42.019B	S42.019D
	S42.019G	S42.019K	S42.019P	S42.019S	S42.021A
	S42.021B	S42.021D	S42.021G	S42.021K	S42.021P
	S42.021S	S42.022A	S42.022B	S42.022D	S42.022G
	S42.022K	S42.022P	S42.022S	S42.023A	S42.023B

HFRS CODES					
	S42.023D	S42.023G	S42.023K	S42.023P	S42.023S
	S42.024A	S42.024B	S42.024D	S42.024G	S42.024K
	S42.024P	S42.024S	S42.025A	S42.025B	S42.025D
	S42.025G	S42.025K	S42.025P	S42.025S	S42.026A
	S42.026B	S42.026D	S42.026G	S42.026K	S42.026P
	S42.026S	S42.031A	S42.031B	S42.031D	S42.031G
	S42.031K	S42.031P	S42.031S	S42.032A	S42.032B
	S42.032D	S42.032G	S42.032K	S42.032P	S42.032S
	S42.033A	S42.033B	S42.033D	S42.033G	S42.033K
	S42.033P	S42.033S	S42.034A	S42.034B	S42.034D
	S42.034G	S42.034K	S42.034P	S42.034S	S42.035A
	S42.035B	S42.035D	S42.035G	S42.035K	S42.035P
	S42.035S	S42.036A	S42.036B	S42.036D	S42.036G
	S42.036K	S42.036P	S42.036S	S42.101A	S42.101B
	S42.101D	S42.101G	S42.101K	S42.101P	S42.101S
	S42.102A	S42.102B	S42.102D	S42.102G	S42.102K
	S42.102P	S42.102S	S42.109A	S42.109B	S42.109D
	S42.109G	S42.109K	S42.109P	S42.109S	S42.111A
	S42.111B	S42.111D	S42.111G	S42.111K	S42.111P
	S42.111S	S42.112A	S42.112B	S42.112D	S42.112G
	S42.112K	S42.112P	S42.112S	S42.113A	S42.113B
	S42.113D	S42.113G	S42.113K	S42.113P	S42.113S
	S42.114A	S42.114B	S42.114D	S42.114G	S42.114K
	S42.114P	S42.114S	S42.115A	S42.115B	S42.115D
	S42.115G	S42.115K	S42.115P	S42.115S	S42.116A
	S42.116B	S42.116D	S42.116G	S42.116K	S42.116P
	S42.116S	S42.121A	S42.121B	S42.121D	S42.121G
	S42.121K	S42.121P	S42.121S	S42.122A	S42.122B
	S42.122D	S42.122G	S42.122K	S42.122P	S42.122S
	S42.123A	S42.123B	S42.123D	S42.123G	S42.123K
	S42.123P	S42.123S	S42.124A	S42.124B	S42.124D
	S42.124G	S42.124K	S42.124P	S42.124S	S42.125A
	S42.125B	S42.125D	S42.125G	S42.125K	S42.125P
	S42.125S	S42.126A	S42.126B	S42.126D	S42.126G
	S42.126K	S42.126P	S42.126S	S42.131A	S42.131B
	S42.131D	S42.131G	S42.131K	S42.131P	S42.131S
	S42.132A	S42.132B	S42.132D	S42.132G	S42.132K
	S42.132P	S42.132S	S42.133A	S42.133B	S42.133D
	S42.133G	S42.133K	S42.133P	S42.133S	S42.134A
	S42.134B	S42.134D	S42.134G	S42.134K	S42.134P
	S42.134S	S42.135A	S42.135B	S42.135D	S42.135G
	S42.135K	S42.135P	S42.135S	S42.136A	S42.136B
	S42.136D	S42.136G	S42.136K	S42.136P	S42.136S
	S42.141A	S42.141B	S42.141D	S42.141G	S42.141K
	S42.141P	S42.141S	S42.142A	S42.142B	S42.142D
	S42.142G	S42.142K	S42.142P	S42.142S	S42.143A
	S42.143B	S42.143D	S42.143G	S42.143K	S42.143P
	S42.143S	S42.144A	S42.144B	S42.144D	S42.144G
	S42.144K	S42.144P	S42.144S	S42.145A	S42.145B
	S42.145D	S42.145G	S42.145K	S42.145P	S42.145S
	S42.146A	S42.146B	S42.146D	S42.146G	S42.146K
	S42.146P	S42.146S	S42.151A	S42.151B	S42.151D
	S42.151G	S42.151K	S42.151P	S42.151S	S42.152A
	S42.152B	S42.152D	S42.152G	S42.152K	S42.152P
	S42.152S	S42.153A	S42.153B	S42.153D	S42.153G
	S42.153K	S42.153P	S42.153S	S42.154A	S42.154B
	S42.154D	S42.154G	S42.154K	S42.154P	S42.154S
	S42.155A	S42.155B	S42.155D	S42.155G	S42.155K
	S42.155P	S42.155S	S42.156A	S42.156B	S42.156D
	S42.156G	S42.156K	S42.156P	S42.156S	S42.191A

HFRS CODES					
	S42.191B	S42.191D	S42.191G	S42.191K	S42.191P
	S42.191S	S42.192A	S42.192B	S42.192D	S42.192G
	S42.192K	S42.192P	S42.192S	S42.199A	S42.199B
	S42.199D	S42.199G	S42.199K	S42.199P	S42.199S
	S42.201A	S42.201B	S42.201D	S42.201G	S42.201K
	S42.201P	S42.201S	S42.202A	S42.202B	S42.202D
	S42.202G	S42.202K	S42.202P	S42.202S	S42.209A
	S42.209B	S42.209D	S42.209G	S42.209K	S42.209P
	S42.209S	S42.211A	S42.211B	S42.211D	S42.211G
	S42.211K	S42.211P	S42.211S	S42.212A	S42.212B
	S42.212D	S42.212G	S42.212K	S42.212P	S42.212S
	S42.213A	S42.213B	S42.213D	S42.213G	S42.213K
	S42.213P	S42.213S	S42.214A	S42.214B	S42.214D
	S42.214G	S42.214K	S42.214P	S42.214S	S42.215A
	S42.215B	S42.215D	S42.215G	S42.215K	S42.215P
	S42.215S	S42.216A	S42.216B	S42.216D	S42.216G
	S42.216K	S42.216P	S42.216S	S42.221A	S42.221B
	S42.221D	S42.221G	S42.221K	S42.221P	S42.221S
	S42.222A	S42.222B	S42.222D	S42.222G	S42.222K
	S42.222P	S42.222S	S42.223A	S42.223B	S42.223D
	S42.223G	S42.223K	S42.223P	S42.223S	S42.224A
	S42.224B	S42.224D	S42.224G	S42.224K	S42.224P
	S42.224S	S42.225A	S42.225B	S42.225D	S42.225G
	S42.225K	S42.225P	S42.225S	S42.226A	S42.226B
	S42.226D	S42.226G	S42.226K	S42.226P	S42.226S
	S42.231A	S42.231B	S42.231D	S42.231G	S42.231K
	S42.231P	S42.231S	S42.232A	S42.232B	S42.232D
	S42.232G	S42.232K	S42.232P	S42.232S	S42.239A
	S42.239B	S42.239D	S42.239G	S42.239K	S42.239P
	S42.239S	S42.241A	S42.241B	S42.241D	S42.241G
	S42.241K	S42.241P	S42.241S	S42.242A	S42.242B
	S42.242D	S42.242G	S42.242K	S42.242P	S42.242S
	S42.249A	S42.249B	S42.249D	S42.249G	S42.249K
	S42.249P	S42.249S	S42.251A	S42.251B	S42.251D
	S42.251G	S42.251K	S42.251P	S42.251S	S42.252A
	S42.252B	S42.252D	S42.252G	S42.252K	S42.252P
	S42.252S	S42.253A	S42.253B	S42.253D	S42.253G
	S42.253K	S42.253P	S42.253S	S42.254A	S42.254B
	S42.254D	S42.254G	S42.254K	S42.254P	S42.254S
	S42.255A	S42.255B	S42.255D	S42.255G	S42.255K
	S42.255P	S42.255S	S42.256A	S42.256B	S42.256D
	S42.256G	S42.256K	S42.256P	S42.256S	S42.261A
	S42.261B	S42.261D	S42.261G	S42.261K	S42.261P
	S42.261S	S42.262A	S42.262B	S42.262D	S42.262G
	S42.262K	S42.262P	S42.262S	S42.263A	S42.263B
	S42.263D	S42.263G	S42.263K	S42.263P	S42.263S
	S42.264A	S42.264B	S42.264D	S42.264G	S42.264K
	S42.264P	S42.264S	S42.265A	S42.265B	S42.265D
	S42.265G	S42.265K	S42.265P	S42.265S	S42.266A
	S42.266B	S42.266D	S42.266G	S42.266K	S42.266P
	S42.266S	S42.271A	S42.271D	S42.271G	S42.271K
	S42.271P	S42.271S	S42.272A	S42.272D	S42.272G
	S42.272K	S42.272P	S42.272S	S42.279A	S42.279D
	S42.279G	S42.279K	S42.279P	S42.279S	S42.291A
	S42.291B	S42.291D	S42.291G	S42.291K	S42.291P
	S42.291S	S42.292A	S42.292B	S42.292D	S42.292G
	S42.292K	S42.292P	S42.292S	S42.293A	S42.293B
	S42.293D	S42.293G	S42.293K	S42.293P	S42.293S
	S42.294A	S42.294B	S42.294D	S42.294G	S42.294K
	S42.294P	S42.294S	S42.295A	S42.295B	S42.295D

HFRS CODES					
	S42.295G	S42.295K	S42.295P	S42.295S	S42.296A
	S42.296B	S42.296D	S42.296G	S42.296K	S42.296P
	S42.296S	S42.301A	S42.301B	S42.301D	S42.301G
	S42.301K	S42.301P	S42.301S	S42.302A	S42.302B
	S42.302D	S42.302G	S42.302K	S42.302P	S42.302S
	S42.309A	S42.309B	S42.309D	S42.309G	S42.309K
	S42.309P	S42.309S	S42.311A	S42.311D	S42.311G
	S42.311K	S42.311P	S42.311S	S42.312A	S42.312D
	S42.312G	S42.312K	S42.312P	S42.312S	S42.319A
	S42.319D	S42.319G	S42.319K	S42.319P	S42.319S
	S42.321A	S42.321B	S42.321D	S42.321G	S42.321K
	S42.321P	S42.321S	S42.322A	S42.322B	S42.322D
	S42.322G	S42.322K	S42.322P	S42.322S	S42.323A
	S42.323B	S42.323D	S42.323G	S42.323K	S42.323P
	S42.323S	S42.324A	S42.324B	S42.324D	S42.324G
	S42.324K	S42.324P	S42.324S	S42.325A	S42.325B
	S42.325D	S42.325G	S42.325K	S42.325P	S42.325S
	S42.326A	S42.326B	S42.326D	S42.326G	S42.326K
	S42.326P	S42.326S	S42.331A	S42.331B	S42.331D
	S42.331G	S42.331K	S42.331P	S42.331S	S42.332A
	S42.332B	S42.332D	S42.332G	S42.332K	S42.332P
	S42.332S	S42.333A	S42.333B	S42.333D	S42.333G
	S42.333K	S42.333P	S42.333S	S42.334A	S42.334B
	S42.334D	S42.334G	S42.334K	S42.334P	S42.334S
	S42.335A	S42.335B	S42.335D	S42.335G	S42.335K
	S42.335P	S42.335S	S42.336A	S42.336B	S42.336D
	S42.336G	S42.336K	S42.336P	S42.336S	S42.341A
	S42.341B	S42.341D	S42.341G	S42.341K	S42.341P
	S42.341S	S42.342A	S42.342B	S42.342D	S42.342G
	S42.342K	S42.342P	S42.342S	S42.343A	S42.343B
	S42.343D	S42.343G	S42.343K	S42.343P	S42.343S
	S42.344A	S42.344B	S42.344D	S42.344G	S42.344K
	S42.344P	S42.344S	S42.345A	S42.345B	S42.345D
	S42.345G	S42.345K	S42.345P	S42.345S	S42.346A
	S42.346B	S42.346D	S42.346G	S42.346K	S42.346P
	S42.346S	S42.351A	S42.351B	S42.351D	S42.351G
	S42.351K	S42.351P	S42.351S	S42.352A	S42.352B
	S42.352D	S42.352G	S42.352K	S42.352P	S42.352S
	S42.353A	S42.353B	S42.353D	S42.353G	S42.353K
	S42.353P	S42.353S	S42.354A	S42.354B	S42.354D
	S42.354G	S42.354K	S42.354P	S42.354S	S42.355A
	S42.355B	S42.355D	S42.355G	S42.355K	S42.355P
	S42.355S	S42.356A	S42.356B	S42.356D	S42.356G
	S42.356K	S42.356P	S42.356S	S42.361A	S42.361B
	S42.361D	S42.361G	S42.361K	S42.361P	S42.361S
	S42.362A	S42.362B	S42.362D	S42.362G	S42.362K
	S42.362P	S42.362S	S42.363A	S42.363B	S42.363D
	S42.363G	S42.363K	S42.363P	S42.363S	S42.364A
	S42.364B	S42.364D	S42.364G	S42.364K	S42.364P
	S42.364S	S42.365A	S42.365B	S42.365D	S42.365G
	S42.365K	S42.365P	S42.365S	S42.366A	S42.366B
	S42.366D	S42.366G	S42.366K	S42.366P	S42.366S
	S42.391A	S42.391B	S42.391D	S42.391G	S42.391K
	S42.391P	S42.391S	S42.392A	S42.392B	S42.392D
	S42.392G	S42.392K	S42.392P	S42.392S	S42.399A
	S42.399B	S42.399D	S42.399G	S42.399K	S42.399P
	S42.399S	S42.401A	S42.401B	S42.401D	S42.401G
	S42.401K	S42.401P	S42.401S	S42.402A	S42.402B
	S42.402D	S42.402G	S42.402K	S42.402P	S42.402S
	S42.409A	S42.409B	S42.409D	S42.409G	S42.409K

HFRS CODES	
Gangrene	E08.52 E11.52 E09.52 E10.52 I70.262 I70.463 I70.561 I70.569 I70.663 I70.668 I70.763 I73.01 I96 K44.1 K46.1 N49.3 E13.52 I70.268 I70.269 I70.362 I70.369 I70.568 I70.661 I70.669 I70.761 I70.762 I70.769 K40.41 K45.1 I70.363 I70.469 I70.768 K40.10 K41.10 K43.1 K43.4 I70.263 I70.368 I70.461 I70.468 K35.31 K40.11 K41.41 K42.1 K43.7 A48.0 I70.261 I70.361 I70.462 I70.562 I70.563 I70.662 K40.40 K41.11 A69.0 J85.0 K41.40 K35.891
Hemiplegia	G81.00 G81.01 G81.02 G81.03 G81.04 G81.10 G81.11 G81.12 G81.13 G81.14 G81.90 G81.91 G81.92 G81.93 G81.94
Hypotension	I95.0 I95.1 I95.2 I95.3 I95.81 I95.89 I95.9
Intracranial injury	S06.0X0A S06.0X0D S06.0X0S S06.0X1A S06.0X1D S06.0X1S S06.0X9A S06.0X9D S06.0X9S S06.1X0A S06.1X0D S06.1X0S S06.1X1A S06.1X1D S06.1X1S S06.1X2A S06.1X2D S06.1X2S S06.1X3A S06.1X3D S06.1X3S S06.1X4A S06.1X4D S06.1X4S S06.1X5A S06.1X5D S06.1X5S S06.1X6A S06.1X6D S06.1X6S S06.1X7A S06.1X8A S06.1X9A S06.1X9D S06.1X9S S06.2X0A S06.2X0D S06.2X0S S06.2X1A S06.2X1D S06.2X1S S06.2X2A S06.2X2D S06.2X2S S06.2X3A S06.2X3D S06.2X3S S06.2X4A S06.2X4D S06.2X4S S06.2X5A S06.2X5D S06.2X5S S06.2X6A S06.2X6D S06.2X6S S06.2X7A S06.2X8A S06.2X9A S06.2X9D S06.2X9S S06.300A S06.300D S06.300S S06.301A S06.301D S06.301S S06.302A S06.302D S06.302S S06.303A S06.303D S06.303S S06.304A S06.304D S06.304S S06.305A S06.305D S06.305S S06.306A S06.306D S06.306S S06.307A S06.308A S06.309A S06.309D S06.309S S06.310A S06.310D S06.310S S06.311A S06.311D S06.311S S06.312A S06.312D S06.312S S06.313A S06.313D S06.313S S06.314A S06.314D S06.314S S06.315A S06.315D S06.315S S06.316A S06.316D S06.316S S06.317A S06.318A S06.319A S06.319D S06.319S S06.320A S06.320D S06.320S S06.321A S06.321D S06.321S S06.322A S06.322D S06.322S S06.323A S06.323D S06.323S S06.324A S06.324D S06.324S S06.325A S06.325D S06.325S S06.326A S06.326D S06.326S S06.327A S06.328A S06.329A S06.329D S06.329S S06.330A S06.330D S06.330S S06.331A S06.331D S06.331S S06.332A S06.332D S06.332S S06.333A S06.333D S06.333S S06.334A S06.334D S06.334S S06.335A S06.335D S06.335S S06.336A S06.336D S06.336S S06.337A S06.338A S06.339A S06.339D S06.339S S06.340A S06.340D S06.340S S06.341A S06.341D S06.341S S06.342A S06.342D S06.342S S06.343A S06.343D S06.343S S06.344A S06.344D S06.344S S06.345A S06.345D S06.345S S06.346A S06.346D S06.346S S06.347A S06.348A S06.349A S06.349D S06.349S S06.350A S06.350D S06.350S S06.351A S06.351D S06.351S S06.352A S06.352D S06.352S S06.353A S06.353D S06.353S S06.354A S06.354D S06.354S S06.355A S06.355D S06.355S S06.356A S06.356D S06.356S S06.357A S06.358A S06.359A S06.359D S06.359S S06.360A S06.360D S06.360S S06.361A S06.361D S06.361S S06.362A S06.362D S06.362S S06.363A S06.363D S06.363S S06.364A S06.364D S06.364S S06.365A S06.365D S06.365S S06.366A S06.366D S06.366S S06.367A S06.368A S06.369A S06.369D S06.369S S06.370A S06.370D S06.370S S06.371A S06.371D S06.371S S06.372A S06.372D S06.372S S06.373A S06.373D S06.373S

HFRS CODES					
	S06.374A	S06.374D	S06.374S	S06.375A	S06.375D
	S06.375S	S06.376A	S06.376D	S06.376S	S06.377A
	S06.378A	S06.379A	S06.379D	S06.379S	S06.380A
	S06.380D	S06.380S	S06.381A	S06.381D	S06.381S
	S06.382A	S06.382D	S06.382S	S06.383A	S06.383D
	S06.383S	S06.384A	S06.384D	S06.384S	S06.385A
	S06.385D	S06.385S	S06.386A	S06.386D	S06.386S
	S06.387A	S06.388A	S06.389A	S06.389D	S06.389S
	S06.4X0A	S06.4X0D	S06.4X0S	S06.4X1A	S06.4X1D
	S06.4X1S	S06.4X2A	S06.4X2D	S06.4X2S	S06.4X3A
	S06.4X3D	S06.4X3S	S06.4X4A	S06.4X4D	S06.4X4S
	S06.4X5A	S06.4X5D	S06.4X5S	S06.4X6A	S06.4X6D
	S06.4X6S	S06.4X7A	S06.4X8A	S06.4X9A	S06.4X9D
	S06.4X9S	S06.5X0A	S06.5X0D	S06.5X0S	S06.5X1A
	S06.5X1D	S06.5X1S	S06.5X2A	S06.5X2D	S06.5X2S
	S06.5X3A	S06.5X3D	S06.5X3S	S06.5X4A	S06.5X4D
	S06.5X4S	S06.5X5A	S06.5X5D	S06.5X5S	S06.5X6A
	S06.5X6D	S06.5X6S	S06.5X7A	S06.5X8A	S06.5X9A
	S06.5X9D	S06.5X9S	S06.6X0A	S06.6X0D	S06.6X0S
	S06.6X1A	S06.6X1D	S06.6X1S	S06.6X2A	S06.6X2D
	S06.6X2S	S06.6X3A	S06.6X3D	S06.6X3S	S06.6X4A
	S06.6X4D	S06.6X4S	S06.6X5A	S06.6X5D	S06.6X5S
	S06.6X6A	S06.6X6D	S06.6X6S	S06.6X7A	S06.6X8A
	S06.6X9A	S06.6X9D	S06.6X9S	S06.810A	S06.810D
	S06.810S	S06.811A	S06.811D	S06.811S	S06.812A
	S06.812D	S06.812S	S06.813A	S06.813D	S06.813S
	S06.814A	S06.814D	S06.814S	S06.815A	S06.815D
	S06.815S	S06.816A	S06.816D	S06.816S	S06.817A
	S06.818A	S06.819A	S06.819D	S06.819S	S06.820A
	S06.820D	S06.820S	S06.821A	S06.821D	S06.821S
	S06.822A	S06.822D	S06.822S	S06.823A	S06.823D
	S06.823S	S06.824A	S06.824D	S06.824S	S06.825A
	S06.825D	S06.825S	S06.826A	S06.826D	S06.826S
	S06.827A	S06.828A	S06.829A	S06.829D	S06.829S
	S06.890A	S06.890D	S06.890S	S06.891A	S06.891D
	S06.891S	S06.892A	S06.892D	S06.892S	S06.893A
	S06.893D	S06.893S	S06.894A	S06.894D	S06.894S
	S06.895A	S06.895D	S06.895S	S06.896A	S06.896D
	S06.896S	S06.897A	S06.898A	S06.899A	S06.899D
	S06.899S	S06.9X0A	S06.9X0D	S06.9X0S	S06.9X1A
	S06.9X1D	S06.9X1S	S06.9X2A	S06.9X2D	S06.9X2S
	S06.9X3A	S06.9X3D	S06.9X3S	S06.9X4A	S06.9X4D
	S06.9X4S	S06.9X5A	S06.9X5D	S06.9X5S	S06.9X6A
	S06.9X6D	S06.9X6S	S06.9X7A	S06.9X8A	S06.9X9A
	S06.9X9D	S06.9X9S			
Mental and behavioral disorders due to use of alcohol	F10.10 F10.11 F10.120 F10.121 F10.129 F10.14 F10.150 F10.151 F10.159 F10.180 F10.181 F10.182 F10.188 F10.19 F10.20 F10.21 F10.220 F10.221 F10.229 F10.230 F10.231 F10.232 F10.239 F10.24 F10.250 F10.251 F10.259 F10.26 F10.27 F10.280 F10.281 F10.282 F10.288 F10.29 F10.920 F10.921 F10.929 F10.94 F10.950 F10.951 F10.959 F10.96 F10.97 F10.980 F10.981 F10.982 F10.988 F10.99					
Nausea and vomiting	R11.0 R11.10 R11.11 R11.12 R11.13 R11.14 R11.15 R11.2				
Nosocomial condition	Y95				
Open wound of forearm	S51.001A	S51.001D	S51.001S	S51.002A	S51.002D
	S51.002S	S51.009A	S51.009D	S51.009S	S51.011A
	S51.011D	S51.011S	S51.012A	S51.012D	S51.012S
	S51.019A	S51.019D	S51.019S	S51.021A	S51.021D
	S51.021S	S51.022A	S51.022D	S51.022S	S51.029A
	S51.029D	S51.029S	S51.031A	S51.031D	S51.031S

HFRS CODES					
	S51.032A	S51.032D	S51.032S	S51.039A	S51.039D
	S51.039S	S51.041A	S51.041D	S51.041S	S51.042A
	S51.042D	S51.042S	S51.049A	S51.049D	S51.049S
	S51.051A	S51.051D	S51.051S	S51.052A	S51.052D
	S51.052S	S51.059A	S51.059D	S51.059S	S51.801A
	S51.801D	S51.801S	S51.802A	S51.802D	S51.802S
	S51.809A	S51.809D	S51.809S	S51.811A	S51.811D
	S51.811S	S51.812A	S51.812D	S51.812S	S51.819A
	S51.819D	S51.819S	S51.821A	S51.821D	S51.821S
	S51.822A	S51.822D	S51.822S	S51.829A	S51.829D
	S51.829S	S51.831A	S51.831D	S51.831S	S51.832A
	S51.832D	S51.832S	S51.839A	S51.839D	S51.839S
	S51.841A	S51.841D	S51.841S	S51.842A	S51.842D
	S51.842S	S51.849A	S51.849D	S51.849S	S51.851A
	S51.851D	S51.851S	S51.852A	S51.852D	S51.852S
	S51.859A	S51.859D	S51.859S		
Open wound of head	S01.00XA	S01.00XD	S01.00XS	S01.01XA	S01.01XD
	S01.01XS	S01.02XA	S01.02XD	S01.02XS	S01.03XA
	S01.03XD	S01.03XS	S01.04XA	S01.04XD	S01.04XS
	S01.05XA	S01.05XD	S01.05XS	S01.101A	S01.101D
	S01.101S	S01.102A	S01.102D	S01.102S	S01.109A
	S01.109D	S01.109S	S01.111A	S01.111D	S01.111S
	S01.112A	S01.112D	S01.112S	S01.119A	S01.119D
	S01.119S	S01.121A	S01.121D	S01.121S	S01.122A
	S01.122D	S01.122S	S01.129A	S01.129D	S01.129S
	S01.131A	S01.131D	S01.131S	S01.132A	S01.132D
	S01.132S	S01.139A	S01.139D	S01.139S	S01.141A
	S01.141D	S01.141S	S01.142A	S01.142D	S01.142S
	S01.149A	S01.149D	S01.149S	S01.151A	S01.151D
	S01.151S	S01.152A	S01.152D	S01.152S	S01.159A
	S01.159D	S01.159S	S01.20XA	S01.20XD	S01.20XS
	S01.21XA	S01.21XD	S01.21XS	S01.22XA	S01.22XD
	S01.22XS	S01.23XA	S01.23XD	S01.23XS	S01.24XA
	S01.24XD	S01.24XS	S01.25XA	S01.25XD	S01.25XS
	S01.301A	S01.301D	S01.301S	S01.302A	S01.302D
	S01.302S	S01.309A	S01.309D	S01.309S	S01.311A
	S01.311D	S01.311S	S01.312A	S01.312D	S01.312S
	S01.319A	S01.319D	S01.319S	S01.321A	S01.321D
	S01.321S	S01.322A	S01.322D	S01.322S	S01.329A
	S01.329D	S01.329S	S01.331A	S01.331D	S01.331S
	S01.332A	S01.332D	S01.332S	S01.339A	S01.339D
	S01.339S	S01.341A	S01.341D	S01.341S	S01.342A
	S01.342D	S01.342S	S01.349A	S01.349D	S01.349S
	S01.351A	S01.351D	S01.351S	S01.352A	S01.352D
	S01.352S	S01.359A	S01.359D	S01.359S	S01.401A
	S01.401D	S01.401S	S01.402A	S01.402D	S01.402S
	S01.409A	S01.409D	S01.409S	S01.411A	S01.411D
	S01.411S	S01.412A	S01.412D	S01.412S	S01.419A
	S01.419D	S01.419S	S01.421A	S01.421D	S01.421S
	S01.422A	S01.422D	S01.422S	S01.429A	S01.429D
	S01.429S	S01.431A	S01.431D	S01.431S	S01.432A
	S01.432D	S01.432S	S01.439A	S01.439D	S01.439S
	S01.441A	S01.441D	S01.441S	S01.442A	S01.442D
	S01.442S	S01.449A	S01.449D	S01.449S	S01.451A
	S01.451D	S01.451S	S01.452A	S01.452D	S01.452S
	S01.459A	S01.459D	S01.459S	S01.501A	S01.501D
	S01.501S	S01.502A	S01.502D	S01.502S	S01.511A
	S01.511D	S01.511S	S01.512A	S01.512D	S01.512S
	S01.521A	S01.521D	S01.521S	S01.522A	S01.522D
	S01.522S	S01.531A	S01.531D	S01.531S	S01.532A

HFRS CODES					
	S01.532D	S01.532S	S01.541A	S01.541D	S01.541S
	S01.542A	S01.542D	S01.542S	S01.551A	S01.551D
	S01.551S	S01.552A	S01.552D	S01.552S	S01.80XA
	S01.80XD	S01.80XS	S01.81XA	S01.81XD	S01.81XS
	S01.82XA	S01.82XD	S01.82XS	S01.83XA	S01.83XD
	S01.83XS	S01.84XA	S01.84XD	S01.84XS	S01.85XA
	S01.85XD	S01.85XS	S01.90XA	S01.90XD	S01.90XS
	S01.91XA	S01.91XD	S01.91XS	S01.92XA	S01.92XD
	S01.92XS	S01.93XA	S01.93XD	S01.93XS	S01.94XA
	S01.94XD	S01.94XS	S01.95XA	S01.95XD	S01.95XS
Osteoporosis with fracture	M80.00XA	M80.00XD	M80.00XG	M80.00XK	M80.00XP
	M80.00XS	M80.011A	M80.011D	M80.011G	M80.011K
	M80.011P	M80.011S	M80.012A	M80.012D	M80.012G
	M80.012K	M80.012P	M80.012S	M80.019A	M80.019D
	M80.019G	M80.019K	M80.019P	M80.019S	M80.021A
	M80.021D	M80.021G	M80.021K	M80.021P	M80.021S
	M80.022A	M80.022D	M80.022G	M80.022K	M80.022P
	M80.022S	M80.029A	M80.029D	M80.029G	M80.029K
	M80.029P	M80.029S	M80.031A	M80.031D	M80.031G
	M80.031K	M80.031P	M80.031S	M80.032A	M80.032D
	M80.032G	M80.032K	M80.032P	M80.032S	M80.039A
	M80.039D	M80.039G	M80.039K	M80.039P	M80.039S
	M80.041A	M80.041D	M80.041G	M80.041K	M80.041P
	M80.041S	M80.042A	M80.042D	M80.042G	M80.042K
	M80.042P	M80.042S	M80.049A	M80.049D	M80.049G
	M80.049K	M80.049P	M80.049S	M80.051A	M80.051D
	M80.051G	M80.051K	M80.051P	M80.051S	M80.052A
	M80.052D	M80.052G	M80.052K	M80.052P	M80.052S
	M80.059A	M80.059D	M80.059G	M80.059K	M80.059P
	M80.059S	M80.061A	M80.061D	M80.061G	M80.061K
	M80.061P	M80.061S	M80.062A	M80.062D	M80.062G
	M80.062K	M80.062P	M80.062S	M80.069A	M80.069D
	M80.069G	M80.069K	M80.069P	M80.069S	M80.071A
	M80.071D	M80.071G	M80.071K	M80.071P	M80.071S
	M80.072A	M80.072D	M80.072G	M80.072K	M80.072P
	M80.072S	M80.079A	M80.079D	M80.079G	M80.079K
	M80.079P	M80.079S	M80.08XA	M80.08XD	M80.08XG
	M80.08XK	M80.08XP	M80.08XS	M80.80XA	M80.80XD
	M80.80XG	M80.80XK	M80.80XP	M80.80XS	M80.811A
	M80.811D	M80.811G	M80.811K	M80.811P	M80.811S
	M80.812A	M80.812D	M80.812G	M80.812K	M80.812P
	M80.812S	M80.819A	M80.819D	M80.819G	M80.819K
	M80.819P	M80.819S	M80.821A	M80.821D	M80.821G
	M80.821K	M80.821P	M80.821S	M80.822A	M80.822D
	M80.822G	M80.822K	M80.822P	M80.822S	M80.829A
	M80.829D	M80.829G	M80.829K	M80.829P	M80.829S
	M80.831A	M80.831D	M80.831G	M80.831K	M80.831P
	M80.831S	M80.832A	M80.832D	M80.832G	M80.832K
	M80.832P	M80.832S	M80.839A	M80.839D	M80.839G
	M80.839K	M80.839P	M80.839S	M80.841A	M80.841D
	M80.841G	M80.841K	M80.841P	M80.841S	M80.842A
	M80.842D	M80.842G	M80.842K	M80.842P	M80.842S
	M80.849A	M80.849D	M80.849G	M80.849K	M80.849P
	M80.849S	M80.851A	M80.851D	M80.851G	M80.851K
	M80.851P	M80.851S	M80.852A	M80.852D	M80.852G
	M80.852K	M80.852P	M80.852S	M80.859A	M80.859D
	M80.859G	M80.859K	M80.859P	M80.859S	M80.861A
	M80.861D	M80.861G	M80.861K	M80.861P	M80.861S
	M80.862A	M80.862D	M80.862G	M80.862K	M80.862P
	M80.862S	M80.869A	M80.869D	M80.869G	M80.869K

HFRS CODES										
	M80.869P	M80.869S	M80.871A	M80.871D	M80.871G					
	M80.871K	M80.871P	M80.871S	M80.872A	M80.872D					
	M80.872G	M80.872K	M80.872P	M80.872S	M80.879A					
	M80.879D	M80.879G	M80.879K	M80.879P	M80.879S					
	M80.88XA	M80.88XD	M80.88XG	M80.88XK	M80.88XP					
	M80.88XS	M81.0	M81.6	M81.8						
Other abnormal findings of blood chemistry	R79.0	R79.1	R79.81	R79.82	R79.89	R79.9				
Other and unspecified injuries of head	S09.0XXA	S09.0XXD	S09.0XXS	S09.10XA	S09.10XD					
	S09.10XS	S09.11XA	S09.11XD	S09.11XS	S09.12XA					
	S09.12XD	S09.12XS	S09.19XA	S09.19XD	S09.19XS					
	S09.20XA	S09.20XD	S09.20XS	S09.21XA	S09.21XD					
	S09.21XS	S09.22XA	S09.22XD	S09.22XS	S09.301A					
	S09.301D	S09.301S	S09.302A	S09.302D	S09.302S					
	S09.309A	S09.309D	S09.309S	S09.311A	S09.311D					
	S09.311S	S09.312A	S09.312D	S09.312S	S09.313A					
	S09.313D	S09.313S	S09.319A	S09.319D	S09.319S					
	S09.391A	S09.391D	S09.391S	S09.392A	S09.392D					
	S09.392S	S09.399A	S09.399D	S09.399S	S09.8XXA					
	S09.8XXD	S09.8XXS	S09.90XA	S09.90XD	S09.90XS					
	S09.91XA	S09.91XD	S09.91XS	S09.92XA	S09.92XD					
	S09.92XS	S09.93XA	S09.93XD	S09.93XS						
Other anemias	D64.0	D64.1	D64.2	D64.3	D64.4	D64.81	D64.89	D64.9		
Other arthrosis	M19.011	M19.012	M19.019	M19.021	M19.022	M19.029	M19.031	M19.032	M19.039	M19.041
	M19.042	M19.049	M19.071	M19.072	M19.079	M19.111	M19.112	M19.119	M19.121	M19.122
	M19.129	M19.131	M19.132	M19.139	M19.141	M19.142	M19.149	M19.171	M19.172	M19.179
	M19.211	M19.212	M19.219	M19.221	M19.222	M19.229	M19.231	M19.232	M19.239	M19.241
	M19.242	M19.249	M19.271	M19.272	M19.279	M19.90	M19.91	M19.92	M19.93	
Other bacterial agents as the cause of diseases classified to other chapters	B96.0	B96.1	B96.20	B96.21	B96.22	B96.23	B96.29	B96.3	B96.4	B96.5
	B96.6	B96.7	B96.81	B96.82	B96.89					
Other bacterial intestinal infections	A04.0	A04.1	A04.2	A04.3	A04.4	A04.5	A04.6	A04.71	A04.72	A04.8
	A04.9									
Other cerebrovascular diseases	I67.0	I67.1	I67.2	I67.3	I67.4	I67.5	I67.6	I67.7	I67.81	I67.82
	I67.83	I67.841	I67.848	I67.850	I67.858	I67.89	I67.9			
Other degenerative diseases of nervous system not elsewhere classified	G31.01	G31.09	G31.1	G31.2	G31.81	G31.82	G31.83	G31.84	G31.85	G31.89
	G31.9									
Other diseases of digestive system	K92.0	K92.1	K92.2	K92.81	K92.89	K92.9				
Other disorders of fluid electrolyte and acid-base balance	E87.0	E87.1	E87.2	E87.3	E87.4	E87.5	E87.6	E87.70	E87.71	E87.79
	E87.8									
Other disorders of kidney and ureter not elsewhere classified	N28.0	N28.1	N28.81	N28.82	N28.83	N28.84	N28.85	N28.86	N28.89	N28.9
Other disorders of pancreatic internal secretion	E16.0	E16.1	E16.2	E16.3	E16.4	E16.8	E16.9	N39.0		N39.3
	N39.41	N39.42	N39.43	N39.44	N39.45	N39.46	N39.490	N39.491	N39.492	N39.498
	N39.8	N39.9								
Other fall on same level	W18.00XA	W18.00XD	W18.00XS	W18.01XA	W18.01XD					
	W18.01XS	W18.02XA	W18.02XD	W18.02XS	W18.09XA					
	W18.09XD	W18.09XS	W18.11XA	W18.11XD	W18.11XS					
	W18.12XA	W18.12XD	W18.12XS	W18.2XXA	W18.2XXD					

HFRS CODES	
	W18.2XXS W18.30XA W18.30XD W18.30XS W18.31XA W18.31XD W18.31XS W18.39XA W18.39XD W18.39XS W18.40XA W18.40XD W18.40XS W18.41XA W18.41XD W18.41XS W18.42XA W18.42XD W18.42XS W18.43XA W18.43XD W18.43XS W18.49XA W18.49XD W18.49XS
Other functional intestinal disorders	K59.00 K59.01 K59.02 K59.03 K59.04 K59.09 K59.1 K59.2 K59.31 K59.39 K59.4 K59.8 K59.9
Other hearing loss	H91.01 H91.02 H91.03 H91.09 H91.10 H91.11 H91.12 H91.13 H91.20 H91.21 H91.22 H91.23 H91.3 H91.8X1 H91.8X2 H91.8X3 H91.8X9 H91.90 H91.91 H91.92 H91.93
Other joint disorders not elsewhere classified	M25.00 M25.011 M25.012 M25.019 M25.021 M25.022 M25.029 M25.031 M25.032 M25.039 M25.041 M25.042 M25.049 M25.051 M25.052 M25.059 M25.061 M25.062 M25.069 M25.071 M25.072 M25.073 M25.074 M25.075 M25.076 M25.08 M25.10 M25.111 M25.112 M25.119 M25.121 M25.122 M25.129 M25.131 M25.132 M25.139 M25.141 M25.142 M25.149 M25.151 M25.152 M25.159 M25.161 M25.162 M25.169 M25.171 M25.172 M25.173 M25.174 M25.175 M25.176 M25.18 M25.20 M25.211 M25.212 M25.219 M25.221 M25.222 M25.229 M25.231 M25.232 M25.239 M25.241 M25.242 M25.249 M25.251 M25.252 M25.259 M25.261 M25.262 M25.269 M25.271 M25.272 M25.279 M25.28 M25.30 M25.311 M25.312 M25.319 M25.321 M25.322 M25.329 M25.331 M25.332 M25.339 M25.341 M25.342 M25.349 M25.351 M25.352 M25.359 M25.361 M25.362 M25.369 M25.371 M25.372 M25.373 M25.374 M25.375 M25.376 M25.40 M25.411 M25.412 M25.419 M25.421 M25.422 M25.429 M25.431 M25.432 M25.439 M25.441 M25.442 M25.449 M25.451 M25.452 M25.459 M25.461 M25.462 M25.469 M25.471 M25.472 M25.473 M25.474 M25.475 M25.476 M25.48 M25.50 M25.511 M25.512 M25.519 M25.521 M25.522 M25.529 M25.531 M25.532 M25.539 M25.541 M25.542 M25.549 M25.551 M25.552 M25.559 M25.561 M25.562 M25.569 M25.571 M25.572 M25.579 M25.60 M25.611 M25.612 M25.619 M25.621 M25.622 M25.629 M25.631 M25.632 M25.639 M25.641 M25.642 M25.649 M25.651 M25.652 M25.659 M25.661 M25.662 M25.669 M25.671 M25.672 M25.673 M25.674 M25.675 M25.676 M25.70 M25.711 M25.712 M25.719 M25.721 M25.722 M25.729 M25.731 M25.732 M25.739 M25.741 M25.742 M25.749 M25.751 M25.752 M25.759 M25.761 M25.762 M25.769 M25.771 M25.772 M25.773 M25.774 M25.775 M25.776 M25.78 M25.80 M25.811 M25.812 M25.819 M25.821 M25.822 M25.829 M25.831 M25.832 M25.839 M25.841 M25.842 M25.849 M25.851 M25.852 M25.859 M25.861 M25.862 M25.869 M25.871 M25.872 M25.879 M25.9
Other local infections of skin and subcutaneous tissue	L08.0 L08.1 L08.81 L08.82 L08.89 L08.9
Other medical procedures as the cause of abnormal reaction of the patient	Y84.0 Y84.1 Y84.2 Y84.3 Y84.4 Y84.5 Y84.6 Y84.7 Y84.8 Y84.9
Other noninfective gastroenteritis and colitis	K52.0 K52.1 K52.21 K52.22 K52.29 K52.3 K52.81 K52.82 K52.831 K52.832 K52.838 K52.839 K52.89 K52.9
Other septicemia	A41.01 A41.02 A41.1 A41.2 A41.3 A41.4 A41.50 A41.51 A41.52 A41.53 A41.59 A41.81 A41.89 A41.9
Other soft tissue disorders not elsewhere classified	M79.0 M79.10 M79.11 M79.12 M79.18 M79.2 M79.3 M79.4 M79.5 M79.601 M79.602 M79.603 M79.604 M79.605 M79.606 M79.609 M79.621 M79.622 M79.629 M79.631 M79.632 M79.639 M79.641 M79.642 M79.643 M79.644 M79.645 M79.646 M79.651 M79.652 M79.659 M79.661 M79.662 M79.669 M79.671 M79.672 M79.673 M79.674 M79.675 M79.676 M79.7 M79.81 M79.89 M79.9 M79.A11 M79.A12 M79.A1 M79.A21 M79.A22 M79.A29 M79.A3 M79.A9
Other symptoms and signs involving cognitive functions and awareness	R41.0 R41.1 R41.2 R41.3 R41.4 R41.81 R41.82 R41.83 R41.840 R41.841 R41.842 R41.843 R41.844 R41.89 R4 R44.0 R44.1 R44.2 R44.3 R44.8 R44.9
Other symptoms and signs involving	R29.0 R29.1 R29.2 R29.3 R29.4 R29.5 R29.6 R29.700 R29.701 R29.702 R29.703 R29.704 R29.705 R29.706 R29.707 R29.708 R29.709 R29.710 R29.711 R29.712

HFRS CODES	
the nervous and musculoskeletal systems	R29.713 R29.714 R29.715 R29.716 R29.717 R29.718 R29.719 R29.720 R29.721 R29.722 R29.723 R29.724 R29.725 R29.726 R29.727 R29.728 R29.729 R29.730 R29.731 R29.732 R29.733 R29.734 R29.735 R29.736 R29.737 R29.738 R29.739 R29.740 R29.741 R29.742 R29.810 R29.818 R29.890 R29.891 R29.898 R29.90 R29.91
Parkinson's disease	G20
Penicillin and Methicillin resistance	A49.02 Z16.11 Z22.322 Z16.22 Z16.24 Z16.29 Z86.14 A41.02 Z16.12 Z16.19 Z16.23 B95.62 J15.212 Z16.21 Z16.20 Z16.10
Personal history of other diseases and conditions	Z87.01 Z87.09 Z87.11 Z87.19 Z87.2 Z87.310 Z87.311 Z87.312 Z87.39 Z87.410 Z87.411 Z87.412 Z87.42 Z87.430 Z87.438 Z87.440 Z87.441 Z87.442 Z87.448 Z87.51 Z87.59 Z87.710 Z87.718 Z87.720 Z87.721 Z87.728 Z87.730 Z87.738 Z87.74 Z87.75 Z87.76 Z87.790 Z87.798 Z87.81 Z87.820 Z87.821 Z87.828 Z87.890 Z87.891 Z87.892 Z87.898
Personal history of risk-factors not elsewhere classified	Z91.010 Z91.011 Z91.012 Z91.013 Z91.018 Z91.02 Z91.030 Z91.038 Z91.040 Z91.041 Z91.048 Z91.09 Z91.11 Z91.120 Z91.128 Z91.130 Z91.138 Z91.14 Z91.15 Z91.19 Z91.410 Z91.411 Z91.412 Z91.419 Z91.42 Z91.49 Z91.5 Z91.81 Z91.82 Z91.83 Z91.841 Z91.842 Z91.843 Z91.849 Z91.89
Pneumonia organism unspecified	J18.0 J18.1 J18.2 J18.8 J18.9
Pneumonitis due to solids and liquids	J69.0 J69.1 J69.8
Polyarthrosis	M15.0 M15.1 M15.2 M15.3 M15.4 M15.8 M15.9
Problems related to care-provider dependency	Z74.01 Z74.09 Z74.1 Z74.2 Z74.3 Z74.8 Z74.9
Problems related to life-management difficulty	Z73.0 Z73.1 Z73.2 Z73.3 Z73.4 Z73.5 Z73.6 Z73.810 Z73.811 Z73.812 Z73.819 Z73.82 Z73.89 Z73.9
Problems related to medical facilities and other health care	Z75.0 Z75.1 Z75.2 Z75.3 Z75.4 Z75.5 Z75.8 Z75.9
Problems related to social environment	Z60.0 Z60.2 Z60.3 Z60.4 Z60.5 Z60.8 Z60.9
Respiratory failure not elsewhere classified	J96.00 J96.01 J96.02 J96.10 J96.11 J96.12 J96.20 J96.21 J96.22 J96.90 J96.91 J96.92 J98.01 J98.09 J98.11 J98.19 J98.2 J98.3 J98.4 J98.51 J98.59 J98.6 J98.8 J98.9 J99
Retention of urine	R33.0 R33.8 R33.9
Scoliosis codes	M41.00 M41.02 M41.03 M41.04 M41.05 M41.06 M41.07 M41.08 M41.112 M41.113 M41.114 M41.115 M41.116 M41.117 M41.119 M41.122 M41.123 M41.124 M41.125 M41.126 M41.127 M41.129 M41.20 M41.22 M41.23 M41.24 M41.25 M41.26 M41.27 M41.30 M41.34 M41.35 M41.40 M41.41 M41.42 M41.43 M41.44 M41.45 M41.46 M41.47 M41.50 M41.52 M41.53 M41.54 M41.55 M41.56 M41.57 M41.80 M41.82 M41.83 M41.84 M41.85 M41.86 M41.87 M41.9
Senility	R54
Sequelae of cerebrovascular disease	I69.00 I69.010 I69.011 I69.012 I69.013 I69.014 I69.015 I69.018 I69.019 I69.020 I69.021 I69.022 I69.023 I69.028 I69.031 I69.032 I69.033 I69.034 I69.039 I69.041 I69.042 I69.043 I69.044 I69.049 I69.051 I69.052 I69.053 I69.054 I69.059 I69.061 I69.062 I69.063 I69.064 I69.065 I69.069 I69.090 I69.091 I69.092 I69.093 I69.098 I69.10 I69.110 I69.111 I69.112 I69.113 I69.114 I69.115 I69.118 I69.119 I69.120 I69.121 I69.122 I69.123 I69.128 I69.131 I69.132 I69.133 I69.134 I69.139 I69.141 I69.142 I69.143 I69.144 I69.149 I69.151 I69.152 I69.153 I69.154 I69.159 I69.161 I69.162 I69.163 I69.164 I69.165 I69.169 I69.190 I69.191 I69.192 I69.193 I69.198 I69.20 I69.210 I69.211 I69.212 I69.213 I69.214 I69.215 I69.218 I69.219 I69.220 I69.221 I69.222 I69.223 I69.228 I69.231 I69.232 I69.233 I69.234 I69.239 I69.241 I69.242 I69.243 I69.244 I69.249 I69.251 I69.252 I69.253 I69.254 I69.259 I69.261 I69.262 I69.263 I69.264 I69.265 I69.269 I69.290 I69.291 I69.292 I69.293 I69.298 I69.30 I69.310 I69.311 I69.312 I69.313 I69.314 I69.315 I69.318 I69.319 I69.320 I69.321 I69.322 I69.323 I69.328 I69.331 I69.332 I69.333 I69.334 I69.339 I69.341 I69.342 I69.343 I69.344 I69.349 I69.351 I69.352 I69.353 I69.354 I69.359 I69.361

HFRS CODES	
	I69.362 I69.363 I69.364 I69.365 I69.369 I69.390 I69.391 I69.392 I69.393 I69.398 I69.80 I69.810 I69.811 I69.812 I69.813 I69.814 I69.815 I69.818 I69.819 I69.820 I69.821 I69.822 I69.823 I69.828 I69.831 I69.832 I69.833 I69.834 I69.839 I69.841 I69.842 I69.843 I69.844 I69.849 I69.851 I69.852 I69.853 I69.854 I69.859 I69.861 I69.862 I69.863 I69.864 I69.865 I69.869 I69.890 I69.891 I69.892 I69.893 I69.898 I69.90 I69.910 I69.911 I69.912 I69.913 I69.914 I69.915 I69.918 I69.919 I69.920 I69.921 I69.922 I69.923 I69.928 I69.931 I69.932 I69.933 I69.934 I69.939 I69.941 I69.942 I69.943 I69.944 I69.949 I69.951 I69.952 I69.953 I69.954 I69.959 I69.961 I69.962 I69.963 I69.964 I69.965 I69.969 I69.990 I69.991 I69.992 I69.993 I69.998
Somnolence stupor and coma	R40.0 R40.1 R40.20 R40.2110 R40.2111 R40.2112 R40.2113 R40.2114 R40.2120 R40.2121 R40.2122 R40.2123 R40.2124 R40.2130 R40.2131 R40.2132 R40.2133 R40.2134 R40.2140 R40.2141 R40.2142 R40.2143 R40.2144 R40.2210 R40.2211 R40.2212 R40.2213 R40.2214 R40.2220 R40.2221 R40.2222 R40.2223 R40.2224 R40.2230 R40.2231 R40.2232 R40.2233 R40.2234 R40.2240 R40.2241 R40.2242 R40.2243 R40.2244 R40.2250 R40.2251 R40.2252 R40.2253 R40.2254 R40.2310 R40.2311 R40.2312 R40.2313 R40.2314 R40.2320 R40.2321 R40.2322 R40.2323 R40.2324 R40.2330 R40.2331 R40.2332 R40.2333 R40.2334 R40.2340 R40.2341 R40.2342 R40.2343 R40.2344 R40.2350 R40.2351 R40.2352 R40.2353 R40.2354 R40.2360 R40.2361 R40.2362 R40.2363 R40.2364 R40.2410 R40.2411 R40.2412 R40.2413 R40.2414 R40.2420 R40.2421 R40.2422 R40.2423 R40.2424 R40.2430 R40.2431 R40.2432 R40.2433 R40.2434 R40.2440 R40.2441 R40.2442 R40.2443 R40.2444 R40.3 R40.4
Speech disturbances not elsewhere classified	R47.01 R47.02 R47.1 R47.81 R47.82 R47.89 R47.9
Spinal stenosis (secondary code only)	M48.00 M48.01 M48.02 M48.03 M48.04 M48.05 M48.061 M48.062 M48.07 M48.08 M48.10 M48.11 M48.12 M48.13 M48.14 M48.15 M48.16 M48.17 M48.18 M48.19 M48.20 M48.21 M48.22 M48.23 M48.24 M48.25 M48.26 M48.27 M48.30 M48.31 M48.32 M48.33 M48.34 M48.35 M48.36 M48.37 M48.38 M48.40XA M48.40XD M48.40XG M48.40XS M48.41XA M48.41XD M48.41XG M48.41XS M48.42XA M48.42XD M48.42XG M48.42XS M48.43XA M48.43XD M48.43XG M48.43XS M48.44XA M48.44XD M48.44XG M48.44XS M48.45XA M48.45XD M48.45XG M48.45XS M48.46XA M48.46XD M48.46XG M48.46XS M48.47XA M48.47XD M48.47XG M48.47XS M48.48XA M48.48XD M48.48XG M48.48XS M48.50XA M48.50XD M48.50XG M48.50XS M48.51XA M48.51XD M48.51XG M48.51XS M48.52XA M48.52XD M48.52XG M48.52XS M48.53XA M48.53XD M48.53XG M48.53XS M48.54XA M48.54XD M48.54XG M48.54XS M48.55XA M48.55XD M48.55XG M48.55XS M48.56XA M48.56XD M48.56XG M48.56XS M48.57XA M48.57XD M48.57XG M48.57XS M48.58XA M48.58XD M48.58XG M48.58XS M48.8X1 M48.8X2 M48.8X3 M48.8X4 M48.8X5 M48.8X6 M48.8X7 M48.8X8 M48.8X9 M48.9
Streptococcus and staphylococcus as the cause of diseases classified to other chapters	B95.0 B95.1 B95.2 B95.3 B95.4 B95.5 B95.61 B95.62 B95.7 B95.8

HFRS CODES					
Superficial injury of head	S00.00XA	S00.00XD	S00.00XS	S00.01XA	S00.01XD
	S00.01XS	S00.02XA	S00.02XD	S00.02XS	S00.03XA
	S00.03XD	S00.03XS	S00.04XA	S00.04XD	S00.04XS
	S00.05XA	S00.05XD	S00.05XS	S00.06XA	S00.06XD
	S00.06XS	S00.07XA	S00.07XD	S00.07XS	S00.10XA
	S00.10XD	S00.10XS	S00.11XA	S00.11XD	S00.11XS
	S00.12XA	S00.12XD	S00.12XS	S00.201A	S00.201D
	S00.201S	S00.202A	S00.202D	S00.202S	S00.209A
	S00.209D	S00.209S	S00.211A	S00.211D	S00.211S
	S00.212A	S00.212D	S00.212S	S00.219A	S00.219D
	S00.219S	S00.221A	S00.221D	S00.221S	S00.222A
	S00.222D	S00.222S	S00.229A	S00.229D	S00.229S
	S00.241A	S00.241D	S00.241S	S00.242A	S00.242D
	S00.242S	S00.249A	S00.249D	S00.249S	S00.251A
	S00.251D	S00.251S	S00.252A	S00.252D	S00.252S
	S00.259A	S00.259D	S00.259S	S00.261A	S00.261D
	S00.261S	S00.262A	S00.262D	S00.262S	S00.269A
	S00.269D	S00.269S	S00.271A	S00.271D	S00.271S
	S00.272A	S00.272D	S00.272S	S00.279A	S00.279D
	S00.279S	S00.30XA	S00.30XD	S00.30XS	S00.31XA
	S00.31XD	S00.31XS	S00.32XA	S00.32XD	S00.32XS
	S00.33XA	S00.33XD	S00.33XS	S00.34XA	S00.34XD
	S00.34XS	S00.35XA	S00.35XD	S00.35XS	S00.36XA
	S00.36XD	S00.36XS	S00.37XA	S00.37XD	S00.37XS
	S00.401A	S00.401D	S00.401S	S00.402A	S00.402D
	S00.402S	S00.409A	S00.409D	S00.409S	S00.411A
	S00.411D	S00.411S	S00.412A	S00.412D	S00.412S
	S00.419A	S00.419D	S00.419S	S00.421A	S00.421D
	S00.421S	S00.422A	S00.422D	S00.422S	S00.429A
	S00.429D	S00.429S	S00.431A	S00.431D	S00.431S
	S00.432A	S00.432D	S00.432S	S00.439A	S00.439D
	S00.439S	S00.441A	S00.441D	S00.441S	S00.442A
	S00.442D	S00.442S	S00.449A	S00.449D	S00.449S
	S00.451A	S00.451D	S00.451S	S00.452A	S00.452D
	S00.452S	S00.459A	S00.459D	S00.459S	S00.461A
	S00.461D	S00.461S	S00.462A	S00.462D	S00.462S
	S00.469A	S00.469D	S00.469S	S00.471A	S00.471D
	S00.471S	S00.472A	S00.472D	S00.472S	S00.479A
	S00.479D	S00.479S	S00.501A	S00.501D	S00.501S
	S00.502A	S00.502D	S00.502S	S00.511A	S00.511D
	S00.511S	S00.512A	S00.512D	S00.512S	S00.521A
	S00.521D	S00.521S	S00.522A	S00.522D	S00.522S
	S00.531A	S00.531D	S00.531S	S00.532A	S00.532D
	S00.532S	S00.541A	S00.541D	S00.541S	S00.542A
	S00.542D	S00.542S	S00.551A	S00.551D	S00.551S
	S00.552A	S00.552D	S00.552S	S00.561A	S00.561D
	S00.561S	S00.562A	S00.562D	S00.562S	S00.571A
	S00.571D	S00.571S	S00.572A	S00.572D	S00.572S
	S00.80XA	S00.80XD	S00.80XS	S00.81XA	S00.81XD
	S00.81XS	S00.82XA	S00.82XD	S00.82XS	S00.83XA
	S00.83XD	S00.83XS	S00.84XA	S00.84XD	S00.84XS
	S00.85XA	S00.85XD	S00.85XS	S00.86XA	S00.86XD
	S00.86XS	S00.87XA	S00.87XD	S00.87XS	S00.90XA
	S00.90XD	S00.90XS	S00.91XA	S00.91XD	S00.91XS
	S00.92XA	S00.92XD	S00.92XS	S00.93XA	S00.93XD
	S00.93XS	S00.94XA	S00.94XD	S00.94XS	S00.95XA
	S00.95XD	S00.95XS	S00.96XA	S00.96XD	S00.96XS
	S00.97XA	S00.97XD	S00.97XS		
Superficial injury of lower leg	S80.00XA	S80.00XD	S80.00XS	S80.01XA	S80.01XD
	S80.01XS	S80.02XA	S80.02XD	S80.02XS	S80.10XA

HFRS CODES	
	S80.10XD S80.10XS S80.11XA S80.11XD S80.11XS S80.12XA S80.12XD S80.12XS S80.211A S80.211D S80.211S S80.212A S80.212D S80.212S S80.219A S80.219D S80.219S S80.221A S80.221D S80.221S S80.222A S80.222D S80.222S S80.229A S80.229D S80.229S S80.241A S80.241D S80.241S S80.242A S80.242D S80.242S S80.249A S80.249D S80.249S S80.251A S80.251D S80.251S S80.252A S80.252D S80.252S S80.259A S80.259D S80.259S S80.261A S80.261D S80.261S S80.262A S80.262D S80.262S S80.269A S80.269D S80.269S S80.271A S80.271D S80.271S S80.272A S80.272D S80.272S S80.279A S80.279D S80.279S S80.811A S80.811D S80.811S S80.812A S80.812D S80.812S S80.819A S80.819D S80.819S S80.821A S80.821D S80.821S S80.822A S80.822D S80.822S S80.829A S80.829D S80.829S S80.841A S80.841D S80.841S S80.842A S80.842D S 80.842S S80.849A S80.849D S80.849S S80.851A S80.851D S80.851S S80.852A S80.852D S80.852S S80.859A S80.859D S80.859S S80.861A S80.861D S80.861S S80.862A S80.862D S80.862S S80.869A S80.869D S80.869S S80.871A S80.871D S80.871S S80.872A S80.872D S80.872S S80.879A S80.879D S80.879S S80.911A S80.911D S80.911S S80.912A S80.912D S80.912S S80.919A S80.919D S80.919S S80.921A S80.921D S80.921S S80.922A S80.922D S80.922S S80.929A S80.929D S80.929S
Symptoms and signs concerning food and fluid intake	R63.0 R63.1 R63.2 R63.3 R63.4 R63.5 R63.6 R63.8
Symptoms and signs involving emotional state	R45.0 R45.1 R45.2 R45.3 R45.4 R45.5 R45.6 R45.7 R45.81 R45.82 R45.83 R45.84 R45.850 R45.851 R45.86 R45.87 R45.89
Syncope and collapse	R55
Thyrotoxicosis hyperthyroidism	E05.00 E05.01 E05.10 E05.11 E05.20 E05.21 E05.30 E05.31 E05.40 E05.41 E05.80 E05.81 E05.90 E05.91
Transient cerebral ischemic attacks and related syndromes	G45.0 G45.1 G45.2 G45.3 G45.4 G45.8 G45.9 R45.0 R45.1 R45.2 R45.3 R45.4 R45.5 R45.6 R45.7 R45.81 R45.82 R45.83 R45.84 R45.850 R45.851 R45.86 R45.87 R45.89
Ulcer of lower limb not elsewhere classified	L97.101 L97.102 L97.103 L97.104 L97.105 L97.106 L97.108 L97.109 L97.111 L97.112 L97.113 L97.114 L97.115 L97.116 L97.118 L97.119 L97.121 L97.122 L97.123 L97.124 L97.125 L97.126 L97.128 L97.129 L97.201 L97.202 L97.203 L97.204 L97.205 L97.206 L97.208 L97.209 L97.211 L97.212 L97.213 L97.214 L97.215 L97.216 L97.218 L97.219 L97.221 L97.222 L97.223 L97.224 L97.225 L97.226 L97.228 L97.229 L97.301 L97.302 L97.303 L97.304 L97.305 L97.306 L97.308 L97.309 L97.311 L97.312 L97.313 L97.314 L97.315 L97.316 L97.318 L97.319 L97.321 L97.322 L97.323 L97.324 L97.325 L97.326 L97.328 L97.329 L97.401 L97.402 L97.403 L97.404 L97.405 L97.406 L97.408 L97.409 L97.411 L97.412 L97.413 L97.414 L97.415 L97.416 L97.418 L97.419 L97.421 L97.422 L97.423 L97.424 L97.425 L97.426 L97.428 L97.429 L97.501 L97.502 L97.503 L97.504 L97.505 L97.506 L97.508 L97.509 L97.511 L97.512 L97.513 L97.514 L97.515 L97.516 L97.518 L97.519 L97.521 L97.522 L97.523 L97.524 L97.525 L97.526 L97.528 L97.529 L97.801 L97.802 L97.803 L97.804 L97.805 L97.806 L97.808 L97.809 L97.811 L97.812 L97.813 L97.814 L97.815 L97.816 L97.818 L97.819 L97.821 L97.822 L97.823 L97.824 L97.825 L97.826 L97.828 L97.829 L97.901 L97.902 L97.903 L97.904 L97.905 L97.906 L97.908 L97.909 L97.911 L97.912 L97.913 L97.914 L97.915 L97.916 L97.918 L97.919 L97.921 L97.922 L97.923 L97.924 L97.925 L97.926 L97.928 L97.929

HFRS CODES	
Unknown and unspecified causes of morbidity	R69
Unspecified acute lower respiratory infection	J22
Unspecified dementia	F03.90 F03.91
Unspecified fall	W19.XXXA W19.XXXD W19.XXXS
Unspecified hematuria	R31.0 R31.1 R31.21 R31.29 R31.9
Unspecified renal failure	N19
Unspecified urinary incontinence	R32
Vascular dementia	F01.50 F01.51
Vitamin D deficiency	E55.0 E55.9
Volume depletion	E86.0 E86.1 E86.9

Note: The Hospital Frailty Risk Score was validated by Kundi, H. et al. ["Association of frailty with 30-day outcomes for acute myocardial infarction, heart failure, and pneumonia among elderly adults." *JAMA cardiology* 4.11 (2019): 1084-1091); Kundi, Harun, et al. "Frailty and related outcomes in patients undergoing transcatheter valve therapies in a nationwide cohort." *European heart journal* 40.27 (2019): 2231-2239)]. Codes were manually converted from International ICD10 to US ICD10 and US ICD9.

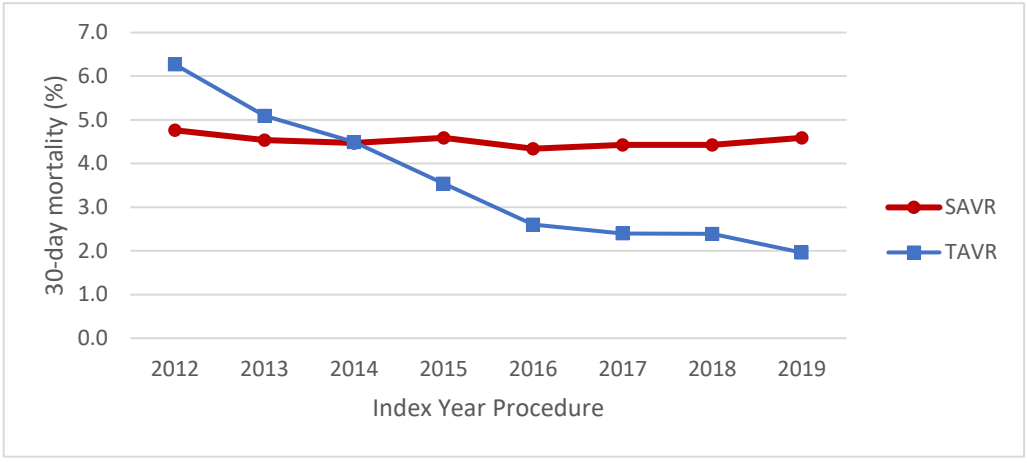
Table S1. Baseline characteristics of all variables included in Elixhauser Comorbidity Index.

	Full Cohort				Isolated SAVR		Elective TAVR and Elective Isolated SAVR			
	SAVR		TAVR				SAVR		TAVR	
Total Patients	211,246	100	179,897	100	95,016	100	76,079	100	147,099	100
Congestive Heart Failure	58,120	27.5	99,102	55.1	24,185	25.5	18,909	24.9	80,585	54.8
Cardiac Arrhythmias	71,265	33.7	90,917	50.5	27,103	28.5	21,682	28.5	74,455	50.6
Valvular Disease	170,624	80.8	161,618	89.8	80,461	84.7	69,301	91.1	135,897	92.4
Pulmonary Circulation Disorders	28,731	13.6	32,050	17.8	12,385	13.0	10,446	13.7	26,012	17.7
Peripheral Vascular Disorders	57,083	27.0	70,679	39.3	26,591	28.0	22,636	29.8	59,784	40.6
Hypertension (Uncomplicated)	117,391	55.6	70,436	39.2	54,226	57.1	45,626	60.0	59,667	40.6
Hypertension (Complicated)	39,660	18.8	79,805	44.4	16,179	17.0	12,597	16.6	64,834	44.1
Paralysis	1,171	0.6	1,733	1.0	455	0.5	315	0.4	1,392	0.9
Other Neurological Disorders	7,738	3.7	13,322	7.4	3,333	3.5	2,422	3.2	10,651	7.2
Chronic Pulmonary Disease	55,017	26.0	63,088	35.1	24,695	26.0	20,000	26.3	51,313	34.9
Diabetes (Uncomplicated)	45,211	21.4	30,246	16.8	19,498	20.5	16,000	21.0	25,142	17.1
Diabetes (Complicated)	19,198	9.1	35,258	19.6	7,259	7.6	5,487	7.2	28,352	19.3
Hypothyroidism	31,534	14.9	40,096	22.3	14,678	15.4	12,004	15.8	32,872	22.3
Renal Failure	31,296	14.8	56,842	31.6	12,655	13.3	9,564	12.6	45,197	30.7
Liver Disease	8,144	3.9	11,718	6.5	3,889	4.1	3,133	4.1	9,865	6.7
Peptic Ulcer Disease	2,680	1.3	3,431	1.9	1,146	1.2	880	1.2	2,725	1.9
AIDS/HIV	147	0.1	106	0.1	67	0.1	52	0.1	84	0.1
Lymphoma	2,446	1.2	3,550	2.0	1,082	1.1	844	1.1	2,861	1.9
Metastatic Cancer	1,349	0.6	2,744	1.5	634	0.7	469	0.6	2,225	1.5

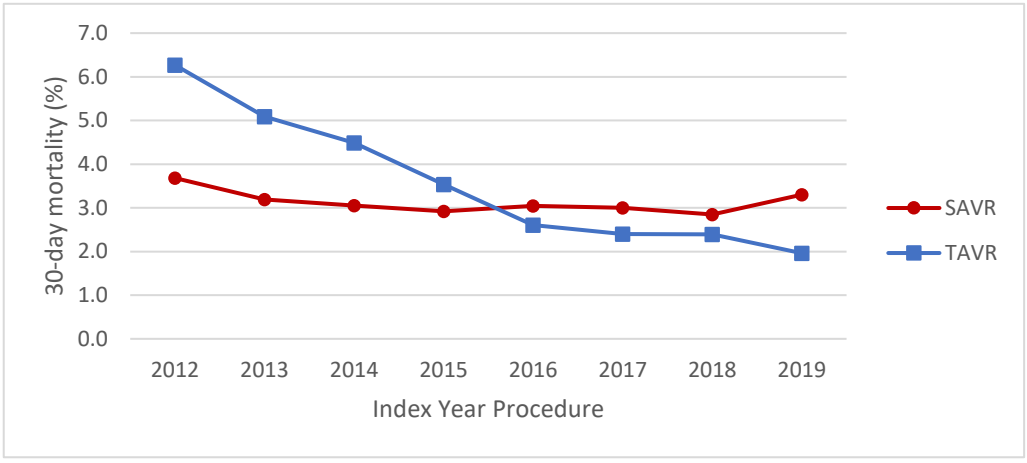
	Full Cohort				Isolated SAVR		Elective TAVR and Elective Isolated SAVR			
	SAVR		TAVR				SAVR		TAVR	
Solid Tumor without Metastasis	15,759	7.5	18,150	10.1	7,078	7.4	5,691	7.5	15,099	10.3
Rheumatoid Arthritis Collagen	8,774	4.2	11,677	6.5	4,156	4.4	3,320	4.4	9,651	6.6
Coagulopathy	10,933	5.2	15,965	8.9	4,780	5.0	3,660	4.8	12,717	8.6
Obesity	30,343	14.4	32,607	18.1	13,870	14.6	11,438	15.0	27,104	18.4
Weight Loss	5,706	2.7	9,553	5.3	2,428	2.6	1,608	2.1	7,321	5.0
Fluid and Electrolyte Disorders	28,742	13.6	45,904	25.5	12,022	12.7	8,621	11.3	35,703	24.3
Blood Loss Anemia	3,721	1.8	6,722	3.7	1,601	1.7	1,222	1.6	5,368	3.6
Deficiency Anemia	14,942	7.1	24,261	13.5	6,366	6.7	4,629	6.1	19,018	12.9
Alcohol Abuse	3,347	1.6	3,038	1.7	1,381	1.5	1,024	1.3	2,459	1.7
Drug Abuse	1,228	0.6	1,349	0.7	526	0.6	356	0.5	1,042	0.7
Psychoses	1,249	0.6	1,085	0.6	572	0.6	391	0.5	801	0.5
Depression	16,814	8.0	22,099	12.3	7,871	8.3	6,074	8.0	17,740	12.1

Figure S1. Temporal trends in unadjusted 30-day mortality.

A: Unadjusted 30-day mortality – Full Cohort



B: Unadjusted 30-day mortality – Isolated SAVR and TAVR



C: Unadjusted 30-day mortality – Elective Isolated SAVR and Elective TAVR

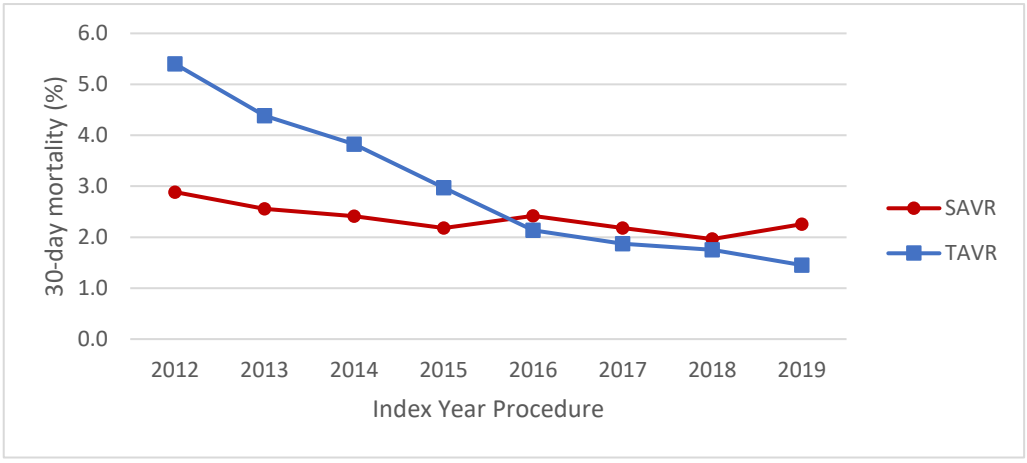
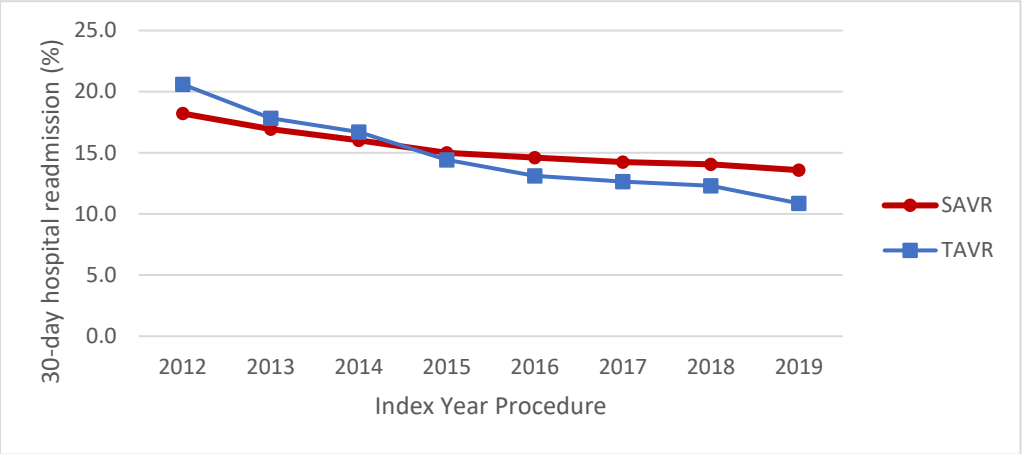
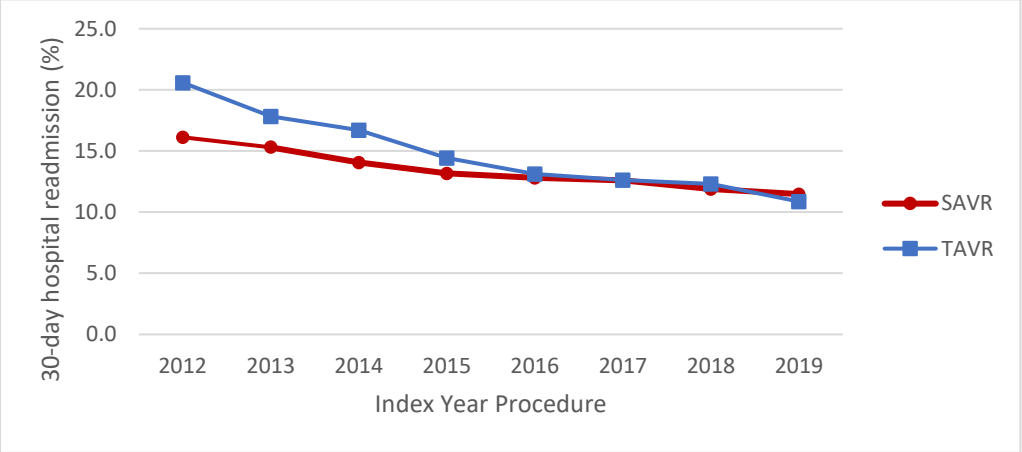


Figure S2. Temporal trends in unadjusted 30-day all-cause hospital readmission.

A: Unadjusted 30-day all-cause hospital readmission – Full Cohort



B: Unadjusted 30-day all-cause hospital readmission – Isolated SAVR and TAVR



C: Unadjusted 30-day all-cause hospital readmission – Elective Isolated SAVR and Elective TAVR

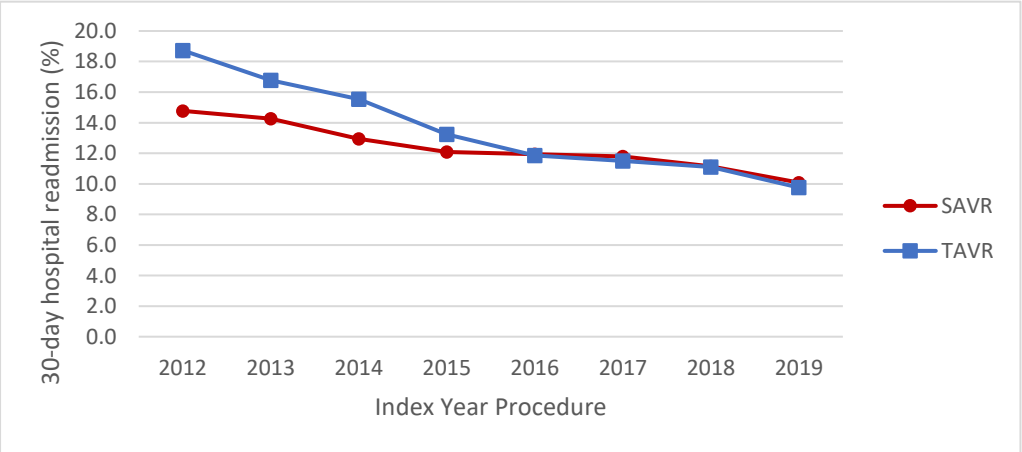
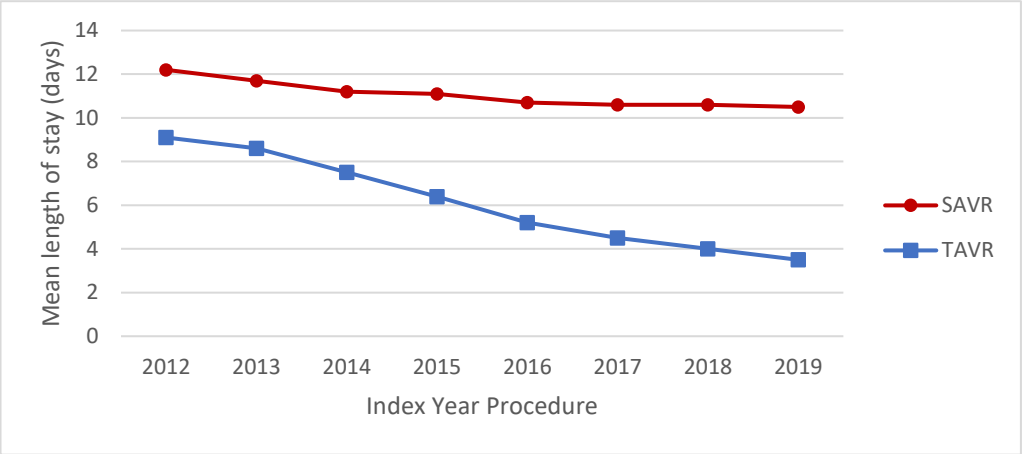
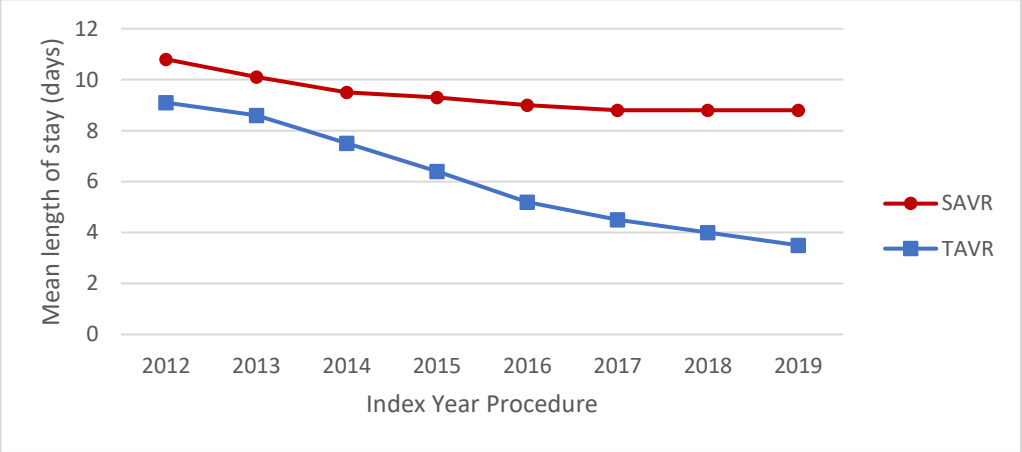


Figure S3. Temporal trends in unadjusted hospital length of stay.

A: Unadjusted hospital length of stay – Full Cohort



B: Unadjusted hospital length of stay – Isolated SAVR and TAVR



C: Elective Isolated SAVR and Elective TAVR