Trends in hospitalization and factors associated with in-hospital death among pediatric admissions with implantable cardioverter defibrillators

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Abstract

Background: As pediatric implantable cardioverter defibrillator (ICD) utilization increases, hospital admission rates will increase. Data regarding hospitalizations among pediatric patients with ICDs is lacking. In addition, hospital mortality rates are unknown. This study aimed to evaluate 1) trends in hospitalization rates of admissions over 20 years, 2) hospital mortality, and 3) factors associated with hospital mortality among pediatric admissions with ICDs. Methods: The Kids' Inpatient Database (2000-2016) was used to identify all hospitalizations with an existing ICD ?20 years of age. ICD9/10 codes were used to stratify admissions by underlying diagnostic category as: 1) congenital heart disease (CHD), 2) primary arrhythmia, 3) primary cardiomyopathy, or 4) other. Trends were analyzed using linear regression. Hospital and patient characteristics among hospital deaths were compared to those surviving to discharge using mixed multivariable logistic regression, accounting for hospital clustering. Results: Of 42,570,716 hospitalizations, 4165 were admitted <21 years with an ICD. ICD admissions increased four-fold (p = 0.002) between 2000-2016. Hospital death occurred in 54 (1.3%). In multivariable analysis, cardiomyopathy (OR 3.5, 95%CI 1.1–11.2, p=0.04) and CHD (OR 4.8, 95%CI 1.5–15.6, p=0.01) were significantly associated with mortality. In further exploratory multivariable analysis incorporating a coexisting diagnosis of heart failure, only the presence of heart failure remained associated with mortality (OR 8.6, 95%CI 3.7-20.0, p<0.0001). Conclusions: Pediatric ICD hospitalization are increasing over time and hospital mortality is low (1.3%). Hospital mortality is associated with cardiomyopathy or CHD; however, the underlying driver for in-hospital death may be heart failure.

INTRODUCTION:

Advances in technology have increased our ability to utilize implantable cardioverter defibrillators (ICD) in the young. ICDs are primarily implanted to provide protection against lethal arrhythmias for children with inheritable arrhythmia syndromes, congenital heart disease (CHD), and cardiomyopathies. Increasingly they are being considered among children with arrhythmias and severe heart failure on ventricular assist devices. Studies have shown that the use of ICDs as a bridge to transplantation decreases pre-transplant mortality. Little is known about the rates of mortality, hospitalizations, or causes of death among children with ICD implantations. The primary aim of this study was to evaluate trends in hospital admissions among children with ICDs. Our secondary aims were to determine hospital mortality rates and to explore factors associated with in-hospital death. We hypothesized that 1) ICD related hospitalizations have increased over time and would be higher in patients with primary cardiomyopathies or congenital heart disease compared to those with primary arrhythmia disorders and 2) in-hospital mortality is more likely to be associated with underlying factors such as congenital heart disease or heart failure.

Methods:

The Kids' Inpatient Database (KID) for the years 2000, 2003, 2006, 2009, 2012 and 2016 was used to identify all ICD related hospitalizations. The KID is part of the Healthcare Cost and Utilization Project (HCUP), managed by the Agency for Healthcare Research and Quality (AHRQ) and is the only all-payer inpatient care database for pediatric admissions (defined as age at discharge [?]20 years) in the United States that. It represents 2-3 million discharges per year from public hospitals, specialty hospitals and academic medical centers. Weighted totals were used for analysis. Specific details regarding data in the KID databases are provided in the supplemental section.

For the purposes of this study, ICD admissions were included, defined as patients with existing ICDs at the time of admission. Admissions related to new ICD implantation based on ICD-9 and ICD-10 procedure codes (listed in supplemental information) during the admission were excluded. Procedural codes for replacement of leads or generators without new implant ICD codes were included in ICD admissions. Diagnostic codes were used to categorize admissions into one of four mutually exclusive primary diagnostic categories of underlying disease which were defined as primary 1) CHD (e.g. Tetralogy of Fallot) 2) cardiomyopathy (CM, e.g. hypertrophic CM), 3) arrhythmia disorder (e.g. Long QT syndrome) and 4) Other (e.g. muscular dystrophy or patients in whom diagnostic category could not be determined based on ICD codes available). Coding was hierarchical, with CHD before cardiomyopathy and cardiomyopathy before arrhythmia. As an example, a discharge with Tetralogy of Fallot and cardiomyopathy diagnostic codes was considered primary congenital heart disease. Minor defects such as atrial septal defects (ASD), patent ductus arteriosus (PDA) and patent foramen ovale (PFO) were not included in the CHD category. Secondary cardiomyopathy due to nutritional deficiencies (e.g beri beri) and alcoholic cardiomyopathy were not included in the cardiomyopathy category.

The first aim of the study was to evaluate trends over time in pediatric admissions with ICDs. Rates of hospitalization were calculated by using included hospitalizations < 21 years of age as the numerator and total hospitalizations < 21 years as the denominator, and were calculated by year. The second aim was to determine rates of in-hospital death among admissions with ICDs. All deaths during ICD hospitalizations were identified and compared to total ICD hospitalizations by year. Discharges resulting in hospice care were excluded from this analysis. Our third aim was to evaluate factors associated with in-hospital death in pediatric admissions with ICDs. Data collection included patient demographics and hospital characteristics [hospital region (Northeast, Midwest, South, West) and hospital type (rural, urban non-teaching, and urban teaching)]. Patient characteristics included age, sex, race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, or other which included Asian/Pacific Islander, American Indian, and other), and primary payor (government included Medicare and Medicaid, private insurance company including health maintenance organization, and self-pay, no charge, or other), admission season (fall-September, October, November; winter – December, January, February; spring – March, April, May; Summer – June, July, August). Specific details regarding categorization by diagnosis are provided in the supplemental data. Data regarding other admission factors including whether the admission was elective, whether there was a code for heart failure, cardiac surgery or procedure, ICD complication (consisting of diagnostic codes for mechanical complications, ICD infection, pneumothorax, hemothorax or procedural codes of ICD-revisions) or cardiac arrest were collected. Specific ICD codes used are provided in the supplemental section.

Statistical Analysis:

Continuous variables are presented as means with standard deviation or median with interquartile ranges (IQRs) based on distribution and categorical variables are presented as frequencies (percentages). To address our first aim, the number of ICD hospital admissions per 100,000 pediatric hospitalizations by year was determined and graphed by year. The rates of hospitalizations appeared linear and thus linear regression was used to evaluate the changes in hospitalization rates over time. Linear regression was also used to evaluate changes in hospitalization rates by underlying diagnostic category over time. For the second aim, mortality overall and by grouped year was calculated as deaths over all ICD admissions.

For the third aim, we first performed univariate logistic regression analysis to evaluate associations between independent variables and the outcome of hospital death. Variables associated with mortality with a p <0.2 were then included in a multivariable analysis. To account for hospital clustering, multivariable mixed logistic regression modeling was used, using hospital as a random effect. Given the relatively lower number of outcomes and multiple potential degrees of freedom for the multivariable analysis, we assessed the race/ethnicity variable and noted similar odds in non-Hispanic white, Hispanic, and other compared to Black race. Therefore, race was condensed into a binary variable of Non-Hispanic Black and Non-Black categories to limit the degrees of freedom for the multivariable analysis.

Given that a diagnosis of heart failure was possibly in the mechanistic pathway of death, it was initially omitted from the multivariable model. In a secondary analysis, to evaluate for the possible intermediary effects of heart failure, an exploratory analysis was then performed including heat failure in the multivariable model. To accommodate for multiple testing when including heart failure as a covariate, a Bonferroni correction was applied to the final exploratory model and a p value of <0.008 was considered statistically significant. For all other models and testing, a two-sided p-value of < 0.05 was considered significant. Statistical analysis was performed using SAS version 9.4 (SAS Institute Inc., Cary, NC).

Results:

Out of a total of 42,570,716 weighted pediatric admissions, 4165 were among patients [?]20 years of age with ICDs at the time of admission. Pediatric ICD admissions increased significantly from 2000 to 2016 (2.9/100,000 in 2000 to 16/100,000 in 2016, p = 0.002), with a steeper increase from 2000-2009 (Figure 1). Admissions by underlying diagnoses varied over time (Figure 2). Overall, cardiomyopathy was the most common underlying diagnosis throughout all time periods. ICD admission with an underlying diagnosis of primary arrhythmia decreased from 25% in 2006 to 16% of all admissions in 2016 (p = 0.06) (Figure 2). ICD admissions with heart failure diagnosis increased significantly over time accounting for 16% in 2000 and 33% in 2016 (p = 0.029, Figure 3).

Among patients with ICDs, there were a total of 54 in-hospital deaths (1.3%) at a median age of 18 years (IQR 15-20 years) while 4111 (98.7%) survived to discharge (median age 17 yrs., IQR 14-19 yrs). The total percentage of deaths among ICD hospitalizations increased, starting with 0.7% in 2000. With the exception of a small rise in 2009 (2.2%), overall rates of deaths remained approximately 1.0-1.5% of ICD admissions (Supplementary Figure 1).

The baseline characteristics of the pediatric ICD admissions overall and by mortality status are shown in Table 1. The majority of the admissions were between the ages of 13-20 years admitted to urban teaching hospitals. Hospitalization rates were relatively similar by region and by season. A majority (80%) were not elective admissions. An ICD complication was present in 15% of the admissions. Cardiac procedures or surgeries were fairly common; 30% of patients that died had some form of cardiac procedure or surgery compared to 20% of those that were discharged.

On univariate analysis, in-hospital death among admissions with ICDs was significantly associated with male sex, non-Hispanic Black race, underlying diagnosis of cardiomyopathy or congenital heart disease and presence of heart failure (Table 2). Age group and insurance type were not associated with in-hospital death. On initial multivariable analysis (excluding heart failure from our model), an underlying diagnosis of cardiomyopathy (OR 3.5, 95% CI 1.1 – 11, p = 0.04) and CHD (OR 4.8, 95% CI 1.5 – 15.6, p = 0.01) were significantly associated with mortality, with a trend seen in non-Hispanic Black race (OR 1.9, 95% CI 0.99 – 3.8, p = 0.05) (Table 3). Notably, non-Hispanic Black patients with ICDs more frequently had a diagnosis of heart failure or cardiomyopathy (Table 4). In addition, while overall mortality was 1.3%, mortality among non-Hispanic Black race was 2.3%. Among all ICD admissions and a concomitant diagnosis of heart failure, mortality was 3.7%. To assess if the relationship of race and heart failure, an interaction term was included in the analysis and did not show an interaction between race and heart failure diagnosis in this cohort, suggesting that the relationship between non-Hispanic Black race and death was not mediated by the presence of heart failure. Nevertheless, because heart failure 1) has been shown in prior studies to be higher among Black race and 2) is likely to be higher among cardiomyopathy patients, yet 3) may be on the causal pathway, an exploratory analysis was performed by including heart failure diagnosis in the multivariable model. On exploratory multivariable analysis including heart failure, only the presence of heart failure (OR 8.6, 95% CI 3.7-19.6, $p<0.0001$) remained significantly associated with in-hospital mortality (Table 5).

Discussion:

Our data demonstrates an increasing trend in pediatric ICD admissions over time. These findings are in line with reported increasing rates of pediatric ICD implantation over time . Cardiomyopathy was the most common underlying diagnosis in all the years, likely due to the need for hospitalization for other comorbidities and may reflect an increasing trend in ICD utilization for primary prevention in patients with cardiomyopathy. An underlying diagnosis of primary arrhythmia demonstrated a decreasing trend in the rate of hospitalizations after 2006. Although data is not available to assess reasons for this decline, we speculate that utilization of ICDs in primary arrhythmia patients may be decreasing with evolving practices; as the knowledge of inappropriate shocks, electrical storm, and alternative medical management strategies improves among primary arrhythmia patients, ICD implantations may be decreasing. For example, it is likely that more caution and consideration is being taken before prophylactic ICD implantation among patients with Long QT type 3 and Catecholaminergic Polymorphic Ventricular Tachycardia. Patients with primary arrhythmias are also less likely to have other comorbidities that may necessitate hospitalization.

Our data suggest that among hospitalizations for young patients with ICDs, those with an underlying diagnosis of cardiomyopathy or congenital heart disease have significantly higher odds of in-hospital death when compared to those with primary arrhythmia diagnosis. While our study was not powered to address the possible trend of increased mortality seen among non-Hispanic Black race this may warrant further investigation in the future.

We noted that a diagnosis of heart failure increased over time among ICD admissions suggesting the possibility of increased utilization of ICDs in heart failure patients. Prior studies have demonstrated increased in-hospital mortality among patients admitted with heart failure who have arrhythmias and Silka et al demonstrated abnormal ventricular function to be significantly correlated with mortality among patients with ICDs. Although exploratory, our multivariable analysis found that only a diagnosis of heart failure was associated with in-hospital death, increasing the odds of mortality among patients admitted with ICDs by ten-fold ($p < 0.001$), independent of underlying diagnosis. Of note, the mortality rate among ICD admissions with heart failure in our cohort was 3.7%, which is lower than the previously reported mortality rate of 7.3% in all heart-failure related hospitalizations. The KID database is not designed to identify reasons for the lower mortality but one might speculate that children with heart failure in whom an ICD is implanted may be of a different risk profile than those who do not have ICDs. For example, implantation of an ICD requires the ability for the patient to tolerate not only the procedure, but anesthesia and induction, and thus may be limited to patients with less procedural risks. In addition, predicted survival of less than 1 year is a relative contraindication for ICD implantation.

In this study, we were unable to determine the exact cause of death based on diagnostic codes; however, our data suggests that in-hospital deaths are less among patients with primary arrhythmia disorders and higher among those with cardiomyopathy and congenital heart disease with the driver of death mainly related to heart failure.

Limitations:

Administrative databases provide the benefit of including large groups of patients across the nation and can be helpful in obtaining large samples sizes for rare diseases or rare outcomes. However, they lack the clinical details and are susceptible to coding errors. This study is based on assumptions formed by diagnostic codes and hence the conclusions may be prone to errors. This study also represents the hospitalizations and not individual patients. However, in-hospital deaths would represent individual patients. We cannot determine the events that lead to the in-hospital death or the actual cause of death. We are also not able to discern the type of ICD (single chamber vs dual chamber) and whether the ICD was utilized, i.e. delivered an appropriate shock, during the admission. It is also difficult to determine the specific forms of congenital heart disease (for example patients with single ventricular physiology vs biventricular repairs), precluding us from stratifying patients into risk categories. Lastly, since only hospital data is available, outcomes such as death after discharge or readmission rates cannot be determined.

Conclusion:

Overall, while pediatric admissions among children with ICDs have been increasing over time there has been a decline in admissions among those with primary arrhythmia diagnosis and an increase in those with heart failure. The overall in-hospital mortality rate is low (1.3%). In-hospital mortality is associated with a diagnosis of cardiomyopathy or congenital heart disease; and the underlying driver for in-hospital death may be heart failure.

References

Table 1: Characteristics of all ICD hospitalizations

Characteristics	**ICD Admissions N= 4165**	**Survived N=4111**	**Died N=54**
Age (years), median (IQR)	17 (14 – 19)	17 (14 – 19)	18 (15 - 20)
Length of stay (days), median (IQR)	3 (1 – 6)	3 (1 – 6)	5 (2 – 13)
Age group, n (%) 0-6 years 7-12 years 13-20 years	252 (6%) 553 (13%) 3360 (81%)	248 (6%) 548 (13%) 3315 (81%)	– – 46 (85%)
Male, n (%)	2425 (58)	2385 (58%)	40 (74%)
Race/Ethnicity, n (%) Non-Hispanic White Non-Hispanic Black Hispanic Other Missing	1892 (45.4%) 836 (20.1%) 624 (15%) 226 (5.4%) 587 (14.1%)	1873 (46%) 815 (20%) 616 (15%) 223 (5%) 584 (14%)	19 (35%) 20 (37%) – –
Insurance type, n (%) Private Medicaid/Medicare Self-pay/other	2016 (48%) 1792 (43%) 357 (9%)	1995 (49%) 1762 (43%) 354 (8%)	21 (39%) 28 (52%) –
Diagnosis, n (%) Primary Arrhythmia Cardiomyopathy CHD Other/Unknown	1001 (24%) 1628 (39%) 551 (13%) 985 (24%)	997 (24%) 1596 (39%) 541 (13%) 977 (24%)	– 32 (59%) 11 (20%) –
Hospital Region Northeast Midwest South West	774 (19%) 947 (23%) 1517 (36%) 927 (22%)	768 (19%) 936 (23%) 1495 (36%) 913 (22%)	– 10 (18%) 25 (46%) 14 (26%)
Hospital Type Rural Urban non-teaching Urban teaching Missing	142 (3%) 481 (12%) 3445 (83%) 97 (2%)	141 (3%) 475 (12%) 3398 (83%) 97 (2%)	– – 48 (89%)
Admission Season Fall Winter Spring Summer Missing	1041 (25%) 937 (22.5%) 938 (22.5%) 1007 (24%) 242 (6%)	1029 (25%) 920 (22%) 926 (23%) 996 (24%) 240 (6%)	12 (22%) 16 (30%) 12 (22%) 11 (21%)
Presence of Heart Failure, n (%)	1173 (28)	1130 (27)	45 (83%)
Cardiac procedure*, n (%)	849 (20%)	832 (20%)	16 (30%)
ICD complication, n (%)	606 (15%)	597 (14.5%)	9 (17%)

Elective admission, n (%)	861 (21%)	857 (21%)	–
Cardiac arrest, n (%)	355 (8.5%)	336 (8%)	19 (35%)
In-hospital death, n (%)	54 (1.3%)	–	54
"—" Data are less than the required threshold to release information based on HCUP rules/restrictions. All number are weighted totals. ICD: implantable cardioverter defibrillator; CHD: Congenital heart disease	*"—" Data are less than the required threshold to release information based on HCUP rules/restrictions. All number are weighted totals. ICD: implantable cardioverter defibrillator; CHD: Congenital heart disease*	*"—" Data are less than the required threshold to release information based on HCUP rules/restrictions. All number are weighted totals. ICD: implantable cardioverter defibrillator; CHD: Congenital heart disease*	*"—" Data are less than the required threshold to release information based on HCUP rules/restrictions. All number are weighted totals. ICD: implantable cardioverter defibrillator; CHD: Congenital heart disease*

Table 2: Univariate analysis for Hospital Mortality

Characteristics	**Univariate OR (95% CI) p value**	**Univariate OR (95% CI) p value**
Age group 0-6 yrs. 7-12 yrs. 13-20 yrs.	1.2 (0.4 – 3.3) 0.4 (0.1 – 1.3) reference	0.700 0.118 ref
Sex Female Male	reference **1.9 (1.1 - 3.5)**	**0.030**
Race/Ethnicity Non-Hispanic White Non-Hispanic Black Hispanic Other/missing	reference **2.5 (1.3 - 4.7)** 1.4 (0.6 - 3.2) 1.2 (0.3 – 4.4)	ref **0.005** 0.397 0.744
Insurance type Private Medicaid/Medicare Self-pay/other	reference 1.5 (0.9- 2.7) 1.7 (0.7 - 4.2)	ref 0.132 0.267
Diagnosis Primary Arrhythmia Cardiomyopathy CHD Other	reference **4.7 (1.7– 13.1) 5.0 (1.6– 15.0)** 1.7 (0.5 – 5.8)	ref **0.003 0.004** 0.361
Presence of Heart Failure	**11.6 (5.9 - 23.0)**	**<0.0001**
"—" Data are less than the required threshold to release information based on HCUP rules/restrictions. All numbers are weighted totals.	*"—" Data are less than the required threshold to release information based on HCUP rules/restrictions. All numbers are weighted totals.*	*"—" Data are less than the required threshold to release information based on HCUP rules/restrictions. All numbers are weighted totals.*

Table 3. Multivariable analysis for Hospital Mortality

Characteristics, n (%)	**Multivariable Analysis Adj.OR (95% CI) p value**	**Multivariable Analysis Adj.OR (95% CI) p value**
Sex Female Male	reference 1.7 (0.8 – 3.8)	0.19
Race/Ethnicity Non-Hispanic Black Non-Black	1.9 (0.99 – 3.8) reference	0.05 ref
Diagnosis Primary Arrhythmia Cardiomyopathy CHD Other	reference **3.5 (1.1 – 11.2) 4.8 (1.5 – 15.6)** 1.2 (0.3– 5.3)	ref **0.04 0.01** 0.82

"—" Data are less than the required threshold to release information based on HCUP rules/restrictions. All number are weighted total; CHD: congenital heart disease	*"—" Data are less than the required threshold to release information based on HCUP rules/restrictions. All number are weighted total; CHD: congenital heart disease*	*"—" Data are less than the required threshold to release information based on HCUP rules/restrictions. All number are weighted total; CHD: congenital heart disease*

Table 4: Race and diagnosis of Heart failure, Cardiomyopathy or In-hospital death

Heart Failure
Cardiomyopathy
In-hospital death
"–" Data are less than the required threshold to release information based on HCUP rules/restrictions. All numbers are wei

Characteristics, n (%)	**Multivariate (Exploratory) Adj.OR (95% CI) p value**	**Multivariate (Exploratory) Adj.OR (95% CI) p value**
Male	1.8 (0.8 – 3.9)	0.17
Race/Ethnicity Non-Hispanic Black Non-Black	1.4 (0.7 – 2.7) ref	0.31 ref
Diagnosis Primary Arrhythmia Cardiomyopathy CHD Other	ref 1.4 (0.4 – 4.8) 3.0 (0.9 – 9.9) 0.8 (0.2 – 3.5)	ref 0.63 0.08 0.74
Presence of Heart Failure	**8.6 (3.7 – 20.0)**	**<0.0001**
p value<0.008 considered significant for this analysis "–" Data are less than the required threshold to release information based on HCUP rules/restrictions. All numbers are weighted totals. CHD: Congenital heart disease	*p value<0.008 considered significant for this analysis "–" Data are less than the required threshold to release information based on HCUP rules/restrictions. All numbers are weighted totals. CHD: Congenital heart disease*	*p value<0.008 considered significant for this analysis "–" Data are less than the required threshold to release information based on HCUP rules/restrictions. All numbers are weighted totals. CHD: Congenital heart disease*

Table 5: Exploratory Multivariable analysis including Heart Failure

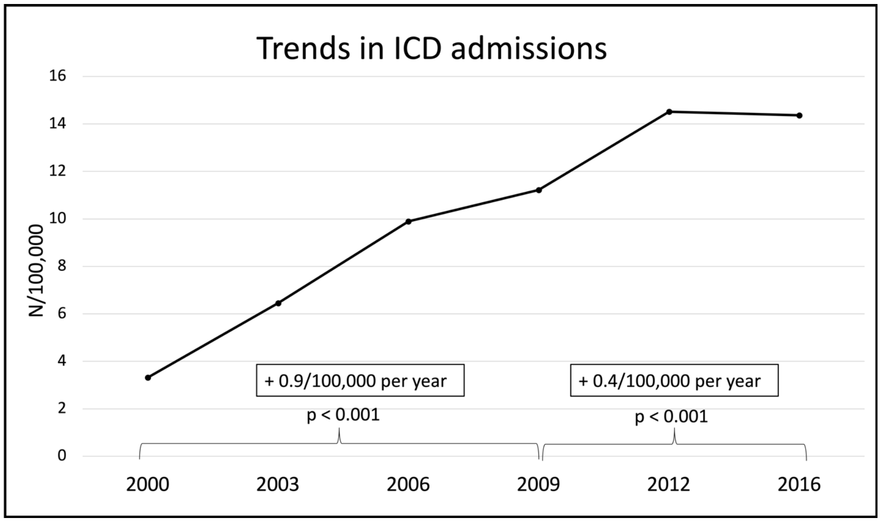


Figure 1: ICD admissions increased significantly from 2000-2016 with a steeper rate of increase from 2000-2009.

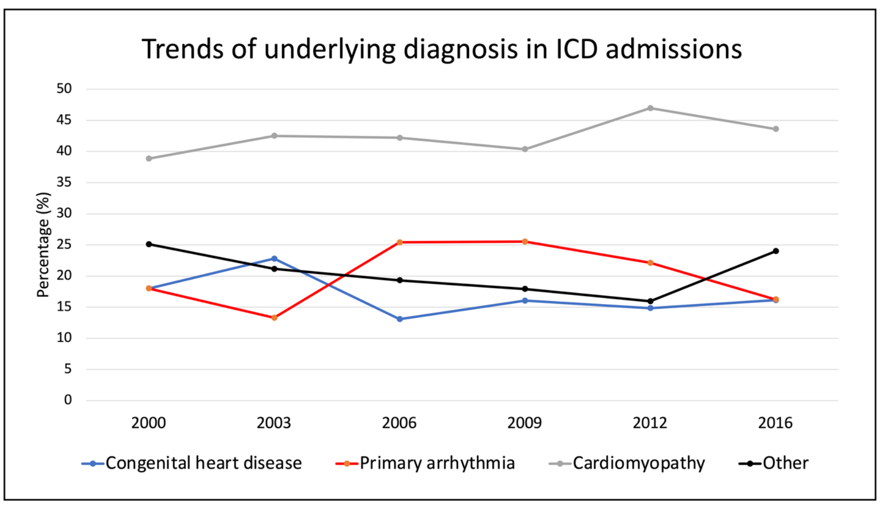


Figure 2: Trends in ICD admissions over time by underlying diagnoses from 2000-2016.

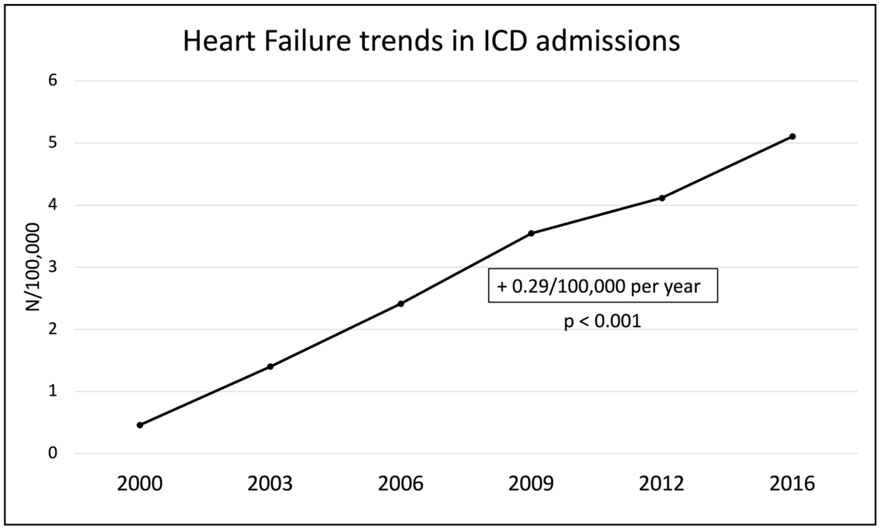


Figure 3: Diagnosis of heart failure increased significantly among ICD admissions/100,000 weighted hospital admissions ($p < 0.001$) from 2000-2016.

Supplemental Data:

KID Database:

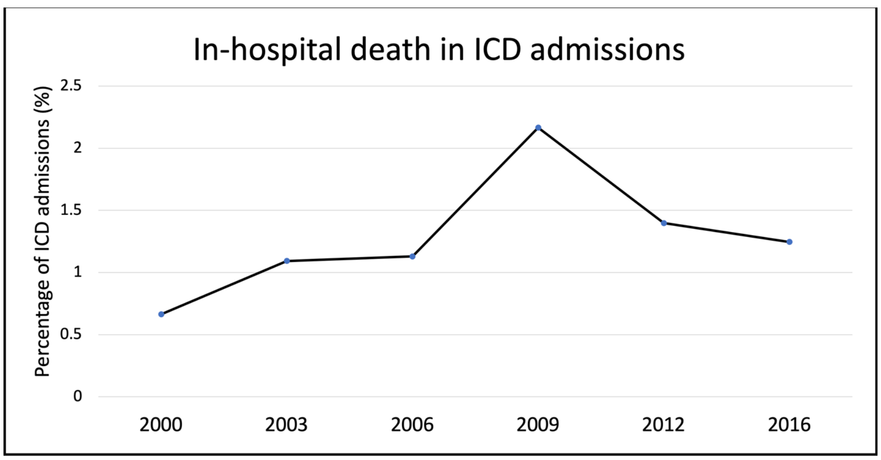
Data in the KID are stratified by geographic region, location/teaching status, bed size category, and whether the hospital is a freestanding children's hospital. Discharges are also stratified by uncomplicated in-hospital births, complicated in-hospital births, and non-newborn pediatric discharges. Discharge weights are created for each stratum in proportion to the known number of American Hospital Association discharges nationally (Normal newborns were sampled at a rate of 10%, while complicated newborns and other pediatric discharges were sampled at a rate of 80%) and using the discharge weights, individual observations are extrapolated to produce national estimates . Prior to the KID 2016, diagnostic (CM) and procedural codes (PCS) were reported using the International Classification of Diseases, Ninth revision (ICD-9) codes and starting with 2016, the ICD-10-CM/PCS coding system was used .

Supraventricular arrhythmias such as atrial flutter/fibrillation codes were not included in the primary arrhythmia group. Heart transplant codes were included in the 'Other' category even if they had diagnoses of cardiomyopathy or arrhythmias. Since not all cardiomyopathy disorders are associated with systolic heart failure (example Hypertrophic Cardiomyopathy or Arrhythmogenic Cardiomyopathy), we did not assume that cardiomyopathy diagnostic categories were necessarily associated with heart failure. We therefore also explored the presence of heart failure, which for this study was defined by heart failure diagnostic codes or codes identifying the implantation or presence of mechanical support (Veno-arterial extracorporeal membrane oxygenation or Ventricular assist device). Codes for ICD infection, lead fracture, pneumothorax, hemothorax, mechanical complication of ICD or need for ICD-revision were used to define the composite variable of ICD complication. The primary outcome was in-hospital death.

Supplementary Tables and Figures

Supplementary Table 1: Characteristics of ICD admissions with Heart failure or Heart transplantation diagnostic codes.

Characteristics	Heart Failure (N = 1173)	Heart Transplants (N = 198)
Age group 0-6 years 7-12 years 13-20 years	23 (2) 89 (8) 1056 (90)	– – 180 (91)
Male sex	714 (61)	107 (54)
Diagnosis Primary Arrhythmia Cardiomyopathy Congenital heart disease Other	90 (8) 746 (63) 128 (11) 208 (18)	44 (22.5) 69 (35) 15 (7.5) 70 (35)
Race (NH Black)	373 (36)	48 (28)
In-hospital death	43 (3.7)	–
"—" Data are less than the required threshold to release information based on HCUP rules/restrictions. All number are weighted total	*"—" Data are less than the required threshold to release information based on HCUP rules/restrictions. All number are weighted total*	*"—" Data are less than the required threshold to release information based on HCUP rules/restrictions. All number are weighted total*



Supplementary Figure 1: Percentage of ICD admissions with in-hospital death over time.