

## Implanted Cardiac Defibrillators for Heart Failure Patients with Kidney Disease

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### Description

Although the prevalence of the commonly coexisting heart failure (HF) and chronic kidney disease (CKD) is increasing, only very limited data from clinical trials and practice guidelines are available to guide therapy in patients with both conditions. HF and CKD are both associated with an increased risk of arrhythmic death as well as non-arrhythmic death. Optimal use of therapies effective at preventing arrhythmic death, such as the implantable cardioverter-defibrillator (ICD), is a challenge in patients with concomitant HF and CKD because those most likely to benefit are those whose HF is severe enough to have a substantial risk of arrhythmic death, but not so severe that they are likely to die from a non-arrhythmic cause.

### Specific Aims

1. Use primary data from a HF population without an ICD enrolled in the Study of Left Ventricular Dysfunction (SOLVD) trials to estimate how variation in severity of HF and CKD affect the risk of cause-specific mortality (sudden cardiac death, non-arrhythmic cardiac death, and non-cardiac mortality), and estimate the rates of CKD and HF disease progression.
2. Validate and expand estimates from the primary data modeling focusing on risks and benefits of ICD therapy, and rates of cause-specific mortality and HF/CKD disease progression in patients of varying age and HF/CKD severity.
3. Based on the transition probabilities from the primary data modeling and literature review, estimate the lifetime benefits of ICD therapy in patients of varying age and HF/CKD using a Markov model.

### Findings

- CKD and HF are independently associated with increased risk of both arrhythmic and non-arrhythmic death, and each condition appears to also influence the progression of the other.

### Main Objective

Estimate how variation in severity of heart failure and chronic kidney disease affect the risk of cause-specific mortality and estimate the rates of chronic kidney disease and heart failure disease progression.

### Chronic Conditions Considered

Heart disease  
Chronic kidney disease

### Preventive Service Considered

This project did not address a specific clinical preventive service.

### Study Design, Data Sources & Sample Size

Primary data from clinical trials, modeling

Heart failure population enrolled in SOLVD trials

### Strategies Addressed from the HHS Strategic Framework on Multiple Chronic Conditions

- 1.A. Identify evidence-supported models
- 3.C. Address multiple chronic conditions in guidelines
- 4.B. Understand the epidemiology of multiple chronic conditions

## Implanted Cardiac Defibrillators for Heart Failure Patients with Kidney Disease (Continued)

- The effect of variation in the severity of CKD and HF on these competing modes of death may influence the impact of the ICD on all-cause mortality.
- Modeling did not suggest that CKD is likely to be a substantial modifier of the effectiveness of ICD therapy. Testing on empirical data is an important next step.

### Publications (as of September 2013)

Uhlig K, Leff B, Kent DM, Dy S, Brunnhuber K, Burgers JS, Greenfield S, Guyatt G, High K, Leipzig R, Mulrow C, Schmader K, Schunemann H, Walter LC, Woodcock J, Boyd CM. A framework for crafting clinical practice guidelines that are relevant to the care and management of people with multimorbidity. *J Gen Intern Med.* In press, 2013.

Boyd CM, Kent DM. Evidence-based medicine and the hard problem of multimorbidity. *J Gen Intern Med.* In press, 2013.

Trikalinos TA, Segal J B, Boyd CM. Addressing multimorbidity in evidence integration and synthesis. *J Gen Intern Med.* In press, 2013.

Weiss CO, Varadhan R, Puhan MA, Vickers A, Bandeen-Roche K, Boyd CM, Kent DM. Multimorbidity and evidence generation. *J Gen Intern Med.* In Press, 2013.

Alsheikh-Ali AA, Trikalinos TA, Ruthazer R, Terrin N, Wong JB, Sarnak MJ, Estes III NAM, Kent DM. Risk of arrhythmic and non-arrhythmic death in patients with heart failure and chronic kidney disease. *American Heart Journal.* 2011;161(1):204-209.