

# Predicting appropriate therapies and mortality in implantable cardioverter-defibrillator recipients: a work in progress

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## RELATED ARTICLE

by Winkler et al,  
see p. 667

In this issue of *Polish Archives of Internal Medicine* (*Pol Arch Intern Med*), Winkler et al<sup>1</sup> identify predictors of mortality and appropriate interventions in implantable cardioverter-defibrillator (ICD) recipients. This is important because the extent to which individual patients benefit from an ICD varies considerably.<sup>2</sup>

The study group included primary and secondary prevention device recipients. It is unsurprising that secondary prevention patients received more appropriate ICD interventions for ventricular arrhythmias. Although some programming features are noted, there is no breakdown of therapies into antitachycardia pacing (ATP) and shock delivery. Taken as a group, patients who received shocks had higher ventricular arrhythmia burden and poorer survival than patients treated only with ATP.<sup>3</sup> In the SCD-HeFT (Sudden Cardiac Death in Heart Failure Trial) post hoc analysis, shocks (appropriate or not) were associated with poorer survival in patients with ICDs.<sup>4,5</sup> This has spurred interest in shock reduction without increasing syncope or sudden cardiac death (SCD) rates. Shocks can be reduced by appropriate programming,<sup>4,6</sup> allowing longer detection times and longer arrhythmia duration before shock delivery. The MADIT-RIT (Multicenter Automatic Defibrillator Implantation Trial – Reduce Inappropriate Therapy) demonstrated that such programming can be associated with improved patient survival.<sup>4,7</sup> Strategic programming of ICD tachycardia detection and therapies is therefore recommended.<sup>4,6</sup>

Although Winkler et al<sup>1</sup> found that cardiac resynchronization therapy (CRT) reduced the risk of appropriate ICD therapy in primary prevention, the influence of CRT on ventricular arrhythmias is uncertain. While some studies suggest a proarrhythmic effect, others suggest an antiarrhythmic effect. In particular, it remains unclear whether

CRT reduces ventricular arrhythmias via reverse remodeling or whether resynchronization and shortening ventricular activation time confers a persistent antiarrhythmic effect.<sup>8</sup> The MADIT-CRT and a recent meta-analysis<sup>8-10</sup> provide evidence that CRT-mediated left ventricular improvement is antiarrhythmic. In the absence of reverse remodeling, CRT with left ventricular epicardial stimulation may be proarrhythmic.<sup>11</sup> Recent data suggest that CRT may be antiarrhythmic in primary prevention recipients and proarrhythmic in secondary prevention recipients.<sup>8</sup>

The authors of the study stated that “in the long-term follow-up, previous myocardial infarction was also predictor of ICD interventions.”<sup>1</sup> It is tempting to speculate that ongoing ischemia could explain this finding. Nevertheless, this differs from a 2010 study that reported no significant difference in the incidence of appropriate ICD shocks in patients with ischemic versus nonischemic cardiomyopathy at the 33-month follow-up.<sup>12</sup>

Winkler et al<sup>1</sup> correctly noted that understanding the relationship between severe mitral regurgitation and appropriate device therapy is challenging. The major causes of severe mitral regurgitation include primary valvular diseases (most commonly mitral valve prolapse)<sup>13</sup> and secondary (functional) valvular dysfunction due to coronary artery disease or cardiomyopathy.<sup>14</sup> The precise relationship between mitral valve prolapse and SCD remains uncertain and the increased SCD risk may be related to the valvular regurgitation rather than the abnormality in the valve’s structural apparatus.<sup>15</sup> While secondary mitral regurgitation is associated with poor prognosis beyond the degree of left ventricular dysfunction, survival rates vary inversely with mitral regurgitation severity,<sup>16</sup> and death may be related to hemodynamic failure or a sudden arrhythmic

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event.<sup>17</sup> Mitral valve repair or replacement may improve symptoms of secondary mitral regurgitation, but there is no evidence that it improves survival.<sup>16</sup> CRT recipients with severe mitral regurgitation have higher mortality rates, and persistent moderate to severe mitral regurgitation post-CRT has been associated with poorer clinical outcomes (survival rates are higher with mitral regurgitation improvement),<sup>16,18</sup> a higher incidence of arrhythmic events, and less reverse remodeling.<sup>19,20</sup>

It is not surprising that the authors found that “total mortality is strongly affected by comorbidities and natural course of heart failure.”<sup>1</sup> ICD therapy is hardly a panacea. Reeder et al<sup>2</sup> pointed out that weighing the inconvenience and risks of living with an ICD against an expected survival advantage is often far from straightforward. Many ICD recipients are older patients with multiple comorbidities and individual choices between extended survival, ICD shocks, and quality of life may not be clear-cut.<sup>2</sup> They performed a secondary analysis of the ICD recipients from the SCD-HeFT and applied an illness-death regression model to concurrently model both ICD shocks and death to help predict each patient’s probability of having received ICD shocks, dying, or both at any given point in time. If validated, their tool may be useful for individualized counseling regarding likely outcomes after device implantation.<sup>2</sup>

While laudable, the current study reminds us that our ability to predict individual outcomes of ICD therapy remains incomplete. Although there is more work to be done, motivation to provide optimal patient care will continue to propel us in the right direction.

## ARTICLE INFORMATION

**DISCLAIMER** The opinions expressed by the author are not necessarily those of the journal editors, Polish Society of Internal Medicine, or publisher.

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