Incidence of Cardiac Arrhythmias in Patients with Diabetes: A Real-World Study

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Introduction

- Type 2 diabetes (T2D) contributes to development of arrhythmias through autonomic dysfunction, electrical remodeling, oxidative stress, and inflammation.
- We conducted a real-world study on the burden of arrhythmias in T2D and their temporal relationship with major adverse cardiovascular events (MACE).

Methods

- Using a national claims database (Symphony Integrated Dataverse), we identified adults with T2D (2018–2024) experiencing arrhythmias, their timing relative to T2D onset, and associations with cardiometabolic comorbidities.

Table 1: Demographics

Demographics	Arrhythmia before T2D (N=487,436)	Arrhythmia and T2D on same day (N=118,862)	Arrhythmia after T2D (N=537,076)
Age at T2D Index			
18-34	4,807 (1%)	721 (1%)	5,199 (1%)
35-44	12,949 (3%)	2,166 (2%)	14,695 (3%)
45-54	36,112 (7%)	6,757 (6%)	43,964 (8%)
55-64	89,241 (18%)	18,037 (15%)	110,544 (21%)
65+	344,327 (71%)	91,181 (77%)	362,674 (68%)
Sex			
Male	275,235 (56%)	70,509 (59%)	301,022 (56%)
Female	212,201 (44%)	48,353 (41%)	236,054 (44%)

Results

- Among 8.8M adults with T2D (median age: 60 years; 46% male, 54% female), a total of 1.14M individuals developed a major arrhythmia (**Table 1, Table 2**).
- Of these, 43% of patients had an arrhythmia prior to T2D; 57% had an arrhythmia on or after T2D (**Figure 1**).
- In patients who had an arrhythmia after T2D: The median time to arrhythmia was 496 days (range: 1–2,007 days).
  - 20% had hypertension (**Table 2**).
  - 38% had more than one metabolic risk factor (chronic kidney disease, dyslipidemia, liver dysfunction, or obesity).
  - 25% experienced a MACE either at the time of or following arrhythmias (median time:1 day; range: 0–1,925 days).
  - MACE occurred in 45% of patients preceding the diagnosis of arrhythmia (median time: 542 days; range: 1–2,373 days).

Figure 1: Patient Funnel

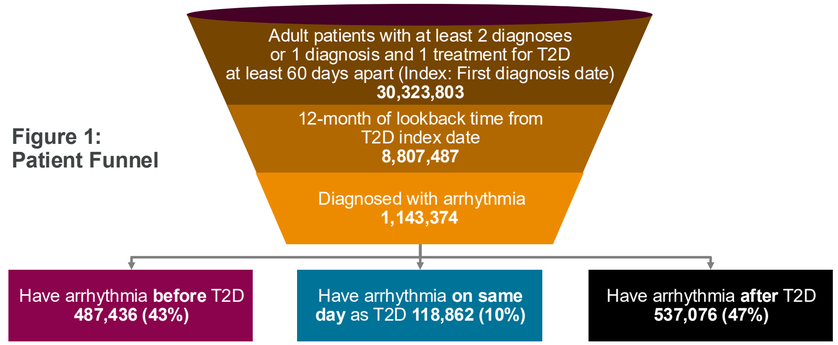

Table 2: Cardiovascular risk factors within 6 months* before or after arrhythmia index date

	Arrhythmia before T2D (N=487,436)				Arrhythmia and T2D on same day (N=118,862)				Arrhythmia after T2D (N=537,076)			
Number of patients	**256,454**	**4,745**	**188,448**	**99,581**	**62,642**	**1,088**	**46,802**	**28,103**	**135,853**	**2,256**	**106,265**	**49,476**
Type of arrhythmia	**% patients with cardiovascular risk factors**	**Non-MACE CVD†**	**Hypertension‡**	**MACE¶**	**% patients with cardiovascular risk factors**	**Non-MACE CVD†**	**Hypertension‡**	**MACE¶**	**% patients with cardiovascular risk factors**	**Non-MACE CVD†**	**Hypertension‡**	**MACE¶**
Atrial Fibrillation	80%	84%	84%	87%	81%	83%	85%	87%	80%	80%	79%	82%
Atrial Flutter	13%	18%	18%	21%	8%	14%	13%	16%	12%	11%	11%	13%
AV Block first degree	7%	9%	10%	10%	5%	7%	7%	8%	10%	8%	10%	10%
AV Block other	1%	3%	2%	3%	1%	1%	1%	2%	2%	1%	2%	2%
AV Block second degree	2%	2%	3%	3%	2%	3%	3%	3%	3%	3%	3%	3%
AV Block third degree	4%	5%	5%	7%	3%	5%	4%	5%	4%	4%	4%	5%
Supraventricular Tachycardia	13%	18%	17%	14%	7%	15%	10%	9%	10%	13%	10%	9%
Ventricular Tachycardia	9%	14%	10%	17%	4%	8%	5%	9%	5%	7%	4%	7%

* MACE could occur anytime relative to arrhythmia. † Non-MACE Cardiovascular Disease (CVD) includes Cardiomyopathy, Myocarditis, and Thromboembolism. ‡ Hypertension includes Essential (primary) hypertension, Secondary hypertension, intraoperative and postprocedural complications and disorders of circulatory system not elsewhere classified, and Hypertensive crisis & Abnormal blood-pressure reading, without diagnosis. ¶ MACE includes Stroke, Myocardial Infarction, Congestive Heart Failure and Acute Coronary Syndrome.

Conclusions

These findings highlight the burden of arrhythmias in T2D and the association between arrhythmias and MACE. Further investigations are warranted to elucidate the potential strategies for early diagnosis, risk stratification and intervention.

Abbreviations

M = million; AV = atrioventricular; CVD = cardiovascular disease; MACE = major adverse cardiovascular events; T2D = Type 2 diabetes.

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