Heart, Lung and Circulation (2016) **25,** 8–11
1443-9506/04/$36.00
http://dx.doi.org/10.1016/j.hlc.2015.10.001

EDITORIAL

Towards Improved Care of Postural Tachycardia Syndrome, Inappropriate Sinus Tachycardia and Vasovagal Syncope Patients: A Call to Action in Australia

Dennis H. Lau, MBBS, PhD [a*], Rajiv Mahajan, MD, PhD [a], Geoffrey Lee, MBChB, PhD [b], Jonathan M. Kalman, MBBS, PhD [b], Prashanthan Sanders, MBBS, PhD [a]

[a]Centre for Heart Rhythm Disorders, South Australian Health and Medical Research Institute, The University of Adelaide and Royal Adelaide Hospital, Adelaide, SA, Australia
[b]The University of Melbourne and The Royal Melbourne Hospital, Melbourne, Vic, Australia

Received 15 September 2015; accepted 2 October 2015; online published-ahead-of-print 20 October 2015

Introduction

The diagnosis and treatment of patients with presumed postural tachycardia syndrome (POTS), inappropriate sinus tachycardia (IST) and vasovagal syncope (VVS) remain a clinical challenge with little data on the natural history of these chronic conditions. The epidemiology of these syndromes in Australia is not well described and these conditions are often under-recognised [1]. Many sufferers of these conditions are debilitated by their recurring symptoms with significant impact on quality of life, cognitive dysfunction, and significant associated psychological impact with elevated anxiety levels and increased symptoms of depression [2,3]. At the same time, there is significant heterogeneity in the clinical care of these patients with variable use of diagnostic tests, significant rate of misdiagnoses, failure to provide comprehensive care and excessive healthcare utilisation [4,5]. The current management of these patients remains suboptimal with a significant gap between knowledge and its clinical application [4]. To this end, the Heart Rhythm Society has recently published an expert consensus statement on POTS/IST/VVS aiming to assist healthcare providers in the care of patients with these conditions [6]. This review summarises the 2015 Heart Rhythm Society Expert Consensus Statement on the diagnosis and treatment of POTS/IST/VVS. The three primary objectives of this document were to: establish working criteria for the diagnosis of these conditions; provide recommendations for their assessment and management; and identify opportunities for future collaborative research [6].

Overcoming the Diagnostic Challenges

One focus of this expert consensus statement on the diagnostic challenges of these conditions was to provide uniform definitions (Table 1). This will facilitate standardisation for multinational clinical trials and registries to improve understanding of these conditions whereby even the epidemiological data and prevalence are not well known. Of note, the diagnoses of POTS and VVS are not always mutually exclusive with known overlap of these conditions. Also, the heart-rate cut-off used to define IST is meant to be a guide only as there is no specific heart-rate criteria that best defines the condition [7].

Importantly, clinicians must recognise that the key to accurate diagnosis of these syndromes lies in accurate history-taking and physical examination with orthostatic vital signs. Routine first line investigations are usually limited to 12-lead ECG, full blood count and thyroid function tests. Tilt table testing can be considered in patients with suspected VVS without clear diagnostic features and to differentiate between convulsive syncope and epilepsy or to establish the diagnosis of pseudosyncope. Further, implantable loop recorders can be considered for the elderly patients with

*Corresponding author at: Centre for Heart Rhythm Disorders, Department of Cardiology, Royal Adelaide Hospital, Adelaide, SA 5000, Australia.
Tel.: +61 8 8222 2723; fax: +61 8 8222 2722, Email: dennis.h.lau@adelaide.edu.au

Table 1 **Definitions for POTS/IST/VVS Syndrome.**

POTS	(1) Frequent symptoms that occur with standing such as lightheadedness, palpitations, tremulousness, generalised weakness, blurred vision, exercise intolerance, and fatigue; (2) An increase in heart-rate of >30 bpm when moving from a recumbent to a standing position held for more than 30 seconds (or >40 bpm in individuals 12 to 19 years of age); and (3) The absence of orthostatic hypotension (>20 mm Hg drop in systolic blood pressure).
IST	Sinus heart rate >100 bpm at rest (with a mean 24-hour heart rate >90 bpm not due to primary causes) and is associated with distressing symptoms of palpitations.
VVS	(1) Occurs with upright posture held for more than 30 seconds or with exposure to emotional stress, pain, or medical settings; (2) Features diaphoresis, warmth, nausea, and pallor; (3) Associated with hypotension and relative bradycardia, when known; and (4) Followed by fatigue.

recurrent and troublesome syncope who lack a clear diagnosis and are at a low risk of a fatal outcome. Additional investigations can be considered based on the clinical history of the individual patient with suspected POTS or IST. These include Holter monitoring, exercise stress testing, transthoracic echocardiogram, tilt table testing, autonomic testing and urine/serum drug screening. Of note, the level of evidence to support these additional investigations is rather poor (Class IIb recommendations - denoting benefit equivalent or possibly exceeding risk) with most of these based on consensus opinion rather than published evidence. In-hospital monitoring has not been mentioned in the consensus document and is only warranted in high-risk individuals with clinical or ECG features suggestive of arrhythmic syncope [5].

Lack of Evidence-based Management

The number of recommendations for management of these conditions with clear benefit to risk ratio (Class IIa and above) is strikingly lacking as summarised in Table 2. These are largely non-pharmacological with physical and lifestyle measures. One exception is the use of ivabradine in IST patients, with evidence from a small prospectively randomised placebo-controlled trial [8]. Limited data also supports the use of ivabradine in POTS patients from a retrospective single-centre case series [9]. Unfortunately, this agent is not available on the Pharmaceutical Benefit Scheme and patients who benefit from this agent are burdened with significant out-of-pocket expenses in Australia. Permanent dual

Table 2 **Limited Treatment Options with Class IIa and Above Recommendations.**

		Class	Level
POTS	A regular, structured, and progressive exercise program	**IIa**	**B (R)**
	Acute intravenous infusion of up to 2 L of saline for those who have short-term clinical decompensations	**IIa**	**C**
IST	Reversible causes of sinus tachycardia should be sought and treated	**I**	**E**
	Ivabradine can be useful therapy	**IIa**	**B (R)**
VVS	Education, reassurance, and promoting salt and fluid intake are indicated, unless contraindicated	**I**	**E**
	Reducing or withdrawing medications that can cause hypotension can be beneficial	**IIa**	**E**
	Physical counter pressure manoeuvers can be useful for patients who have a sufficiently long prodromal period.	**IIa**	**B (R)**
	Dual-chamber pacing can be effective for patients 40 years of age or older with recurrent and unpredictable syncope who have a documented pause $\geq$3 seconds during clinical syncope or an asymptomatic pause $\geq$6 seconds.	**IIa**	**B (R)**

Class of recommendations: Class I is a strong recommendation, denoting benefit greatly exceeding risk; and Class IIa is a somewhat weaker recommendation, denoting benefit probably exceeding risk. Level of evidence: Level B evidence is of a moderate level from randomised trials (B-R) or well-executed non-randomised trials (B-NR); Level C evidence is from weaker studies with significant limitations; and level E evidence is simply a consensus opinion in the absence of credible published evidence.