Canadian Practice Patterns of Venous Thromboembolism Prophylaxis for Adults with Spinal Cord Injury

Ethans K[1*], Deng G[1], Townson

		ACP 2012	SCIRE 2009	PVA 1999
Pharmacological Prophylaxis		LMWH or UH (Grade 2C)	LMWH more effective than UH (Level 1a)	LMWH or UH (Level II)
	Duration	3 months	Unspecified	8-12 Weeks
Mechanical Prophylaxis		Preferably IPCD (Grade 2C)	IPCD or TEDS (Level 4)	IPCD or TEDS (Level I)
	Duration	Unspecified	Unspecified	2 Weeks

Table 1: Summary of recommendations from the three sets of recommendations for VTE prophylaxis in adults with SCI. Each journal used a different grading system for the level of evidence. In the recommendations from the American College of Chest Physicians, Grade 2C corresponds to weak recommendations based on low-quality evidence. In the recommendations from SCIRE, Level 1a evidence corresponds to data from 2 randomized control trials and Level 4 corresponds to data from pre-post study and case series. In the recommendations from PVA, Level I correspond to data from large randomized trials with definitive results, and Level II corresponds to data from small randomized trials with uncertain results.

Methods

The question, "What are you using for VTE and PE prophylaxis at your center?" was posted on a private online forum called "SCI Hallways" whose members consist exclusively of Canadian physiatrists engaging in SCI rehabilitation. Over the course of two weeks, various Canadian physiatrists posted their responses on the forum. The majority of the responses consisted of the specific name of the pharmacological and mechanical prophylaxis, but given the nature of using an online forum, five participants gave vague responses. These participants posted that they used an

3	Dalteparin	8-12 weeks	IPCD + TEDS for 2 weeks	TED Stocking for duration of LMWH
4	Dalteparin	8-12 weeks	IPCD + TEDS for 2 weeks	TED Stocking for duration of LMWH
5	Dalteparin	8-12 weeks	IPCD + TEDS for 2 weeks	TED Stocking for duration of LMWH
6	Dalteparin	8-12 weeks	IPCD + TEDS for 2 weeks	TED Stocking for duration of LMWH
7	Dalteparin	8-12 weeks	IPCD + TEDS for 2 weeks	TED Stocking for duration of LMWH
8	Unspecified LMWH	8-12 weeks	IPCD + TEDS for 2 weeks	TED Stocking for duration of LMWH
9	Enoxaparin or Dalteparin	8-12 weeks	IPCD only until LMWH started	TED Stocking for duration of LMWH
10	Unspecified LMWH	8-12 weeks	Unspecified	Unspecified

Table 2: Tabulated results from respondents with names substituted with identification numbers. LMWH stands for low molecular weight heparin. IPCD stands for intermittent pneumatic compression devices. TEDS stands for Thrombo-Embolic Deterrent Stockings also known as Thrombo-Embolic Deterrent Hose.

Discussion

Relevance of guidelines

The practice patterns of Canadian SCI rehabilitation physicians reflect recommendations that state that there is evidence, although inconsistent, for both mechanical and pharmacological prophylaxis for patients with SCI [3-5]. The inconsistency may be because of the difference between the inclusion and exclusion criteria used by the authors to generate their conclusions. (See Figures 2 and 3 for comparison of patient population for pharmacologic and mechanical prophylaxis used in the three papers).

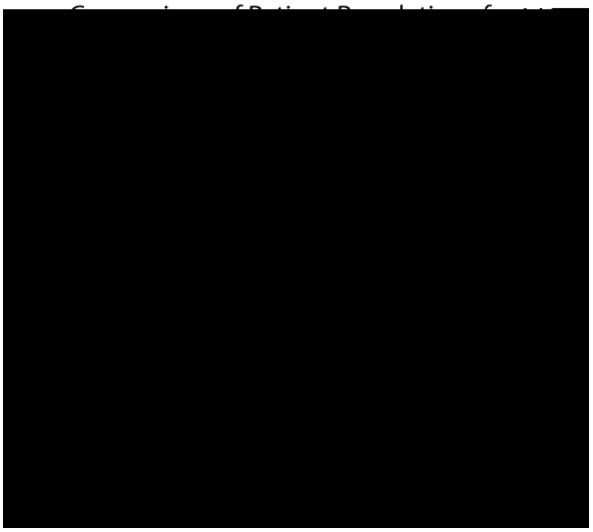

Figure 2: Graph of number of publications versus source comparing patient population for pharmacological prophylaxis. This graph shows that SCIRE derived their recommendations exclusively from SCI patients. American College of Chest Physicians included 4 studies on orthopedic patients, and 7 on other mixed surgical patients. PVA included 1 study on major trauma patients.

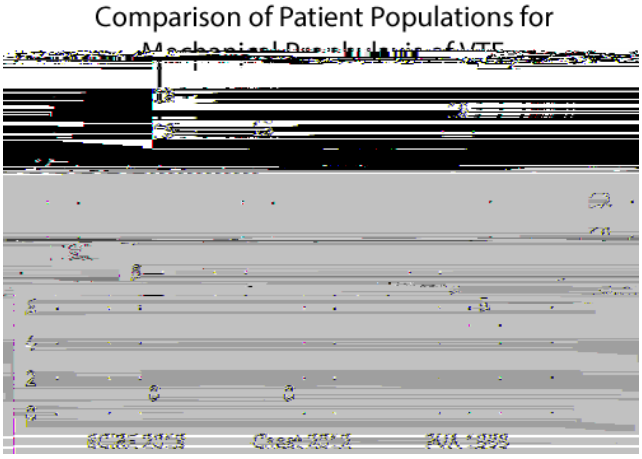

Figure 3: Graph of number of publications versus source comparing patient population for mechanical prophylaxis. SCIRE only included research done on the SCI population. Chest included 9 and 7 studies on orthopedic and general surgery patients, respectively. PVA included 2 studies on orthopedic patients, 1 on neurosurgery patients, 1 on cardiac patients, and 1 on low risk surgical patients.

The SCIRE recommendations published in 2009 is the most recent of the three publications and reviewed studies exclusively in the SCI patient population. The SCIRE recommendations suggest that there is strong evidence for LMWH, but poor evidence for mechanical prophylaxis [4]. The guideline from American College of Chest Physicians in 2012 is not directed at only patients with SCI, but at all non-orthopedic major trauma patients (including traumatic brain injury and spinal surgery) [5]. Additionally, the guideline from PVA (Paralyzed Veteran's Association) in 1 [illegible]

papers. These 4 studies were all published on or prior to 1990 [7-10]. The recommendations from the American College of Chest Physicians are derived from a total of 19 studies with 11 of the 19 studies done in the non-SCI population [5]. The recommendations from SCIRE were derived from 13 studies and the recommendations from PVA were derived from 6 studies with the newest study from 1995 [3,4].

There is even less overlap between the sources used by the major three recommendations for mechanical prophylaxis [3-5]. There are zero studies that all three recommendations cited [3-5]. The only overlap of sources occurs in the SCIRE and PVA guidelines for two studies with one done in 1982 and the other in 1992 [11,12]. Additionally, the primary sources all evaluated a vast number of interventions (including range of motion exercises, massage, bandages, rotating tables, electrical stimulation, venous foot pump, compression stockings, intermittent compression devices) and various patient populations (including SCI, general surgery, orthopedic surgery, neurosurgery, cardiac surgery and abdominal surgery) [10-39].

Mechanical prophylaxis

The options for mechanical prophylaxis includes IPCDs and TED stockings [3-5]. IPCDs are inflatable cuffs placed around the lower limbs that are intermittently inflated via an electrically powered pneumatic pump [40]. TED stockings are compression stockings with a decreasing gradient of pressure in a distal to proximal direction [40]. IPCDs simulate the actions of lower limb muscles to intermittently force the blood in the deep veins back to the heart, and TED stockings increase the velocity of blood flow and prevents the activation of extrinsic coagulation pathway from the venous distention exposing subendothelial tissue 40. One of the biggest advantages of mechanical prophylaxis is the cost effectiveness and the infrequent and minor adverse events (consisting of foot abrasions, superficial thrombophlebitis, and subjective warmth) [41].

The SCIRE review stated that there is Level 4 evidence (weak) for all forms of mechanical prophylaxis [4]. SCIRE evidence is based on two studies which although showing a positive effect for mechanical prophylaxis, were weak (a case series in 2001 and a pre-post study in 1999) [4]. The guideline from American College of Chest Physicians in 2012 stated that the evidence is grade 2C (recommendations based on low-quality evidence) [5]. American College of Chest Physician's guideline is derived from multiple studies from major trauma patients and all were described as having various limitations [5]. The guideline from PVA in 1999 stated that the evidence is level I (data from large randomized trials with definitive results) [3]. The guidelines from PVA were based on studies from the 1970s and 1980s, including studies involving orthopedics, neurosurgery, cardiac surgery and minor surgeries, and outdated forms of mechanical prophylaxis (range of motion exercises, massage, electrical stimuli, and venous foot pump) [3].

The three recommendations had varying grades of evidence for mechanical prophylaxis [3-5]. However, the options, especially TED stockings, have mild and infrequent side effects [40]. In our study, all participants stated that SCI patients used TED stockings and IPCDs during the initial 2 weeks and continued with the TED stockings for the duration of needing LMWH.

Pharmacological Prophylaxis

The SCIRE review states that there is Level 1a evidence (strong) for LMWH being superior to unfractionated side

2. Merli