Pneumatic tourniquet work safety scale: A confirmatory factor analysis

Supplement: Pneumatic tourniquet work safety scale

The scale comprises 41 items, which are categorised into seven domains. All items on the scale are scored positively, using a 5-point Likert scale, where each item is scored from 1 to 5 ('never' = 1, 'rarely' = 2, 'sometimes' = 3, 'often' = 4, 'always' = 5). The minimum total score is 41 (41 × 1 = 41) and the maximum is 205 (41 × 5 = 205). The cut-off point is determined by subtracting the maximum score (205) from the minimum score (41) and dividing by three (205 – 41 = 164, 164 ÷ 3 ≈ 55). This value (55) is added to the minimum score (41) to establish three levels of compliance:

- Low compliance with safety standards (lower third with score 41–95)
- Moderate compliance with safety standards (middle third with score 96–150)
- High compliance with safety standards (upper third with score 151–205).

Sub-scales	Questionnaire items		Response (score)				
			always (5)	usually (4)	occasionally (3)	rarely (2)	never (1)
1: Testing the functioning of pneumatic tourniquets	1	I perform the periodic calibration of the central and portable tourniquets as recommended by the manufacturer.					
	2	I check the cuff and connective tubing for leaks and make sure that pressure remains unchanged on the monitor.					
	3	The connective tubing and power cable are not excessively stretched and are not in the way of the members of the surgical team.					
	4	I set the monitor and audio alarms in such a way that the surgical team becomes aware of any changes.					
	5	I disinfect reusable cuffs when they become contaminated with blood and other bodily discharges according to the instructions given by the manufacturer.					
2: Contraindications for the use of pneumatic tourniquets	6	I examine the limb for nerve injuries (sensory and physical test of the limbs).					
	7	I consider peripheral venous and blood circulation disorders (venous thromboembolism and compartment syndrome).					
	8	I consider vein grafts, fistulas and venous access ports in limbs.					
	9	Before placing the tourniquet cuff, I check the patient's skin for any injuries, e.g. blisters, bruises and necrosis.					
3: Considerations on selecting the right cuff	10	I consider the size and shape of the limb and the age of the patient to select the right cuff.					
	11	I choose the length of the tourniquet cuff in such a way that at least 7.5 cm and at most 15 cm of the cuff overlaps.					
	12	For overweight patients (BMI>30), I use connector cuffs which are suitable for cone-shaped limbs.					

Sub-scales		Questionnaire items	Response (score)				
			always (5)	usually (4)	occasionally (3)	rarely (2)	never (1)
4: Safe application of pneumatic tourniquets before surgery	13	I examine distal pulses to the tourniquet cuff.					
	14	Before fastening the cuff around a limb, I inform the anaesthesiologist.					
	15	For padding, I use at least two layers of wrinkle-free padding which are wider than the tourniquet cuff.					
	16	I fasten the cuff at the most muscular part of the proximal section of the limb.					
	17	While disinfecting the limb, I am careful that the preparation solution does not get under the cuff.					
	18	I am careful that antibiotic prophylaxis is performed 5 to 20 minutes before the tourniquet cuff is inflated.					
	19	After the administration of anaesthetics and before the surgical incision is made, I inform the surgeon of the tourniquet pressure.					
	20	I consider the cases when an Esmarch bandage cannot be used, e.g. due to infection, tumors, clots and fractures.					
	21	Before inflating the cuff, I perform exsanguination by raising the limb or using an Esmarch bandage.					
	22	In the absence of an Esmarch bandage, I am careful to observe the 90° angle for upper limbs, 45° angle for lower limbs and 5-minute confidence time during exsanguination.					
	23	*(Note: For this item, participants were asked to indicate the method they most frequently used before choosing their response.)* To set the tourniquet pressure: • I always use the same pressure (upper limbs: 200–250 mmHg, lower limbs: 250–350 mmHg). • I use a pressure higher than the patient's systolic blood pressure (SBP) (upper limbs: SBP+100 mmHg, lower limbs: SBP+100-150 mmHg). • I use a pressure higher than limb occlusion pressure (LOP) (LOP<130 mmHg +40 mmHg, 131<LOP>190mmHg +60 mmHg, LOP>191 mmHg +80mmHg, pediatric patients LOP +50 mmHg).					

Sub-scales		Questionnaire items	Response (score)				
			always (5)	usually (4)	occasionally (3)	rarely (2)	never (1)
5: Safe application of pneumatic tourniquets during surgery	24	I inform the surgeon and anaesthesiologist about the maximum time the cuff can be inflated: • adults: 60 to 90 minutes for upper limbs, 90 to 120 minutes for lower limbs • children: 60 to 75 minutes.					
	25	In case of bleeding in the surgical site, I check the set pressure and the possibility of a leakage.					
	26	I consider the patient's physiological reactions (e.g. blood pressure and heart rate) to inflation of the cuff.					
	27	If I should deflate the cuff during surgery, I consider the 10- to 15-minute time period.					
	28	When I am deflating the cuff, to avoid sudden decrease in the patient's blood pressure, I use the 'sec stop' button (100 mmHg reduction in pressure every 5 seconds) on portable tourniquets. On central tourniquets, I slowly decrease pressure to zero.					
6: Safe application of pneumatic tourniquets after surgery	29	After deflating the tourniquet cuff, I check the patient's vital signs.					
	30	After deflating the cuff, I check distal pulses in the patient's limb to make sure that blood is circulating and ischemia is unlikely.					
	31	After deflating the tourniquet cuff, I check the site of incision (e.g. bandaging and drain) for the extent of bleeding.					
	32	After removing the tourniquet cuff, I examine the patient's skin (e.g. temperature, colour and injuries) where the cuff was placed.					

Sub-scales	Questionnaire items		Response (score)				
			always (5)	usually (4)	occasionally (3)	rarely (2)	never (1)
7: Record keeping and documentation	33	In the operative report, I write the name of the person who fastened the tourniquet cuff.					
	34	In the operative report, I write the model, registration code, type of cuff and periodic calibration of the tourniquet.					
	35	In the operative report, I write the site of the cuff and the type of padding used under the cuff.					
	36	In the operative report, I record the limb occlusion pressure or systolic blood pressure.					
	37	In the operative report, I record the tourniquet pressure used during surgery.					
	38	In the operative report, I record the patient's skin condition before and after application of the tourniquet cuff.					
	39	In the operative report, I record the times of inflation and deflation of the cuff.					
	40	In the operative report, I record the status of blood circulation in the patient's limb before and after application of the tourniquet cuff by checking the patient's pulse, capillary refill time and colour, and temperature of the limb.					
	41	If I notice ischaemia in the limb after application of the tourniquet cuff, I record it in the operative report.					