0.001)less likely to have an unfavourable outcome (52.9% vs 95.2%) at 6 months after injury compared with patients managed conservatively [4].

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Unsupervised toothbrushing: Risk of airway injury in young children

Despite being an important personal hygiene tool, the toothbrush has the ability to cause significant injury. Oral airway injuries from impalement can be the most serious and even life-threatening [1,2]. Younger children are often injured [3-5] and the severity of the injuries may require multiple medical specialties. Several recent visits to our emergency department where children were injured by improper use of toothbrushes have occurred. One in particular required rapid surgical management due to carotid artery proximity.

A literature search was performed in PubMed as described by Olivera et al. except limiting the results to publications since 2014, which returned 12 results [5]. PubMed was queried with the following search terms: "(toothbrush*) AND ((“2014/01/01” [PDat]: “2018/12/31” [PDat]))" returning 1324 results (performed 03/2018). These were imported to EndNote (Clarivate Analytics, Philadelphia, PA). Titles and keywords were queried with the following terms: injur*, trauma, foreign, case, adverse, airway, and pharyn* returning 171 publications. These publications were manually screened by title and abstract. Bibliographies were screened for additional reports. The majority of the resulting 29 publications contained reports of damage to the airway [1-4,6-16] from toothbrush injury (Fig. 1). Other major contributors were ingestion [17-25], epilepsy [26,27], and others [28-30]. The median age of case reports involving oral/airway injuries from a toothbrush was 2.1 years old (range: 1 year to 45 years old).

The National Electronic Injury Surveillance System (NEISS) database was used to query oral airway injuries involving toothbrushes presenting to the ED. This included cases from January 1, 2006 – December 31, 2016 (search performed 03/2018). The search included a product codes of 1608 (“powered toothbrush or oral irrigator”) and 1629 (“nonelectric toothbrush”), or a screening of “toothbrush,” “brushing teeth,” “brushing his teeth,” or “brushing her teeth” in the free-text narrative.

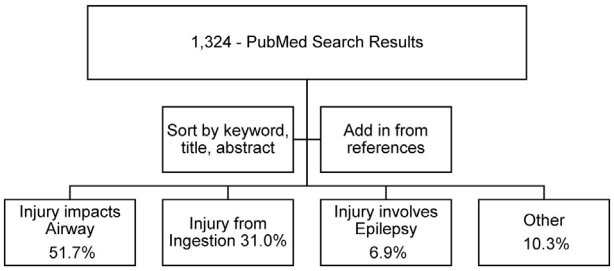

Fig. 1. Pubmed database search outcomes of toothbrush injuries resulted in 4 major categories of reports after literature selection.

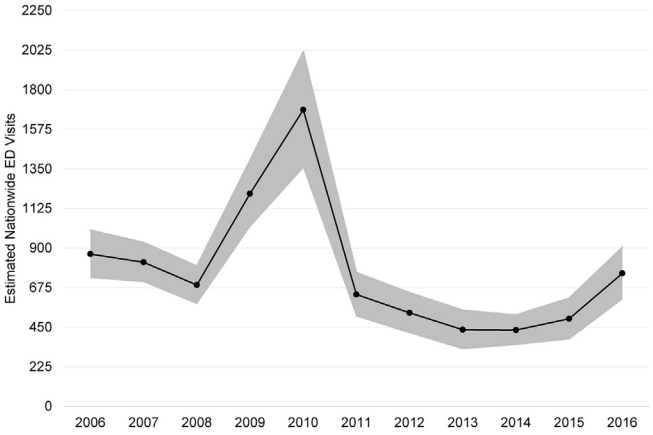

Fig. 2. The NEISS estimated emergency department visit for toothbrush injury from 2006 to 2016 (95% confidence limits shaded).

The NEISS database revealed a nationwide estimate of 8566 oral/airway injuries (95% confidence interval: 6988–10,144) in the ten years queried based on 257 incidences reported by the NEISS database (Fig. 2). There was a steep drop in incidences beginning in 2011. This decline should not be interpreted as a drastic change to injury rates or a vast nationwide-improvement of oral hygiene routine supervision.

Table 1
The demographics of the NEISS database query are summarized, along with information about discharge information.

	N (%)
Sex	
Male	124 (48.2)
Female	133 (51.8)
	n.s. ($P = 0.57$)
Age	
0–4	162 (63.0)
5–9	42 (16.3)
10–59	45 (17.5)
>60	8 (3.1)
	($P < 0.001$)
Race	
White	115 (44.7)
Black	40 (15.6)
Hispanic	17 (6.6)
Asian	6 (2.3)
Other	7 (2.7)
Not stated	72 (28.0)
Disposition	
Treated in ED and released	225 (87.5)
Treated in ED and admitted	26 (10)
Treated in ED and transferred	1 (0.4)
Held for observation	1 (0.4)
Left without being seen	4 (1.6)
Fatality	0

Instead, the NEISS database no longer used "toothbrush" as an injuring product after this time, leading to searching the potentially flaws or incomplete open narrative to count incidents (a limitation to the database use). Demographics of the patients are summarized (Table 1).

The median age of the patients was 3 years old (range 2 months to 92 years; mean 10.5). The majority of injured patients (63% - significantly more than expected) were four years old and younger (Table 1). Most patients were treated in the ED and released, but some needed further intervention. Any needs of these patients beyond the reported ED visit could not be determined.

The NEISS categorizes the injuries by a body part involved and includes more details in the open narrative. There is no body part code for oropharynx, however, so narratives were searched in the probable cases. The most common body part involved in toothbrush injury in our search is the mouth (Table 2). The literature search also found more mouth involvement. On further evaluation of the narrative, the location of the injury was we were able to more accurately discern the location of the injury. The most common location of injury was in the oral cavity followed by the oropharynx (throat, tonsil, pharynx, vallecula, oropharynx, pyriform sinus, posterior pharyngeal wall). The literature search showed the oropharynx was the most common location of injury (Table 2).

Visits to the ED due to toothbrush injuries are not rare, and those injuries affecting the patient's airway can be severe. In fact, warnings are included the instructions of manual and powered toothbrushes cautioning proper supervision of oral care routine in children and those with reduced mental capabilities for safety (Fig. 3).

The risk of injury is particularly high in young children. This supports other studies noting toothbrushes as the leading cause of pediatric oral impalement of young children [31] and the leading cause of pediatric oral injury with an object in the mouth [9].

Even though an object is commonly used, the potential risks for misuse must not be minimized. This is particularly apparent when reviewing the recent literature. While these reports are likely a cross-section of some of the most severe cases, we found several cases affecting the carotid artery, a potentially life-threatening condition [1,3,6,13]. Ingestion or impalement of a toothbrush is a concern for removal management due to its peculiar shape [18] but also due to the bacterial load existing on the brush itself [32-34]. With this in mind, rapid management of the injuries and collaboration with other specialized teams is important.

Table 2
The location of patient injuries are summarized for NEISS database query and literature review.

Body part	N
NEISS category	
Mouth	183
Face	33
Neck	21
Internal	20
Literature category match	
Mouth	9
Face	1
Neck	5
Internal	9
Other	5
NEISS narrative	
Oral cavity	105
Oropharynx	95
Face	33
Gastrointestinal tract	12
Teeth/gums	9
Esophageal	3
Literature narrative match	
Oral cavity	5
Oropharynx	10
Gastrointestinal	9
Other	5

Fig. 3. Examples of warning labels on retail toothbrushes advising proper supervision of toothbrush use.

Declarations of interest

None.

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VTE ought to be divided not only in DVT and PTE, but also in subacute/chronic forms☆

To the Editor,

In papers [1-3] and in the Guidelines [4,5], the venous thromboembolism (VTE) has for a considerably long period of time been divided into deep vein thrombosis (DVT) and into pulmonary thromboembolism (PTE). This is indeed valid for the *acute* VTE forms. As far as it is known, there have not been any different classifications of VTE in publications, including the most recent. Subacute/chronic forms (or complications, such as Post-thrombotic syndrome, Post-PTE syndrome and Chronic Thromboembolic Pulmonary Hypertension - CTPH) have usually been mentioned after the classification [4,6], if at all [2].

The residual symptoms and the signs following the acute VTE episode are not rare, belonging to the Post-thrombotic syndrome or the Post-PTE syndrome (and later to CTPH).

A) The *Post-thrombotic syndrome* occurs in around *half of the patients following DVT* and it represents any one combination of leg pain, weightiness, itching, edema (in various degrees), and even chronic leg ulcers. The incomplete resolution of thrombus in DVT is a major risk factor for the Post-thrombotic syndrome. It sometimes occurs when the patient has not taken anticoagulation medication, but it sometimes occurs even after regular anticoagulant treatment of DVT. The Post-thrombotic syndrome decreases the quality of life in the health-related aspect (HRQoL) and increases health-care expenditure [7,8].

B) Similar to the Post-thrombotic syndrome is the "*Post-PTE syndrome*". Based on the available evidence, approximately in *half of PTE patients* the symptoms persist and limit daily activities which diminishes HRQoL, in some cases for years to come [9,10]. Thrombi in pulmonary arteries (PA) have been reported to persist in 25–33% of PTE patients after a period of 6–12 months of an index event [10,11]. Furthermore, PA pressures can be persistently elevated, and the right ventricle may not work properly [10,11]. Consequently, the Post-PTE syndrome can be the adequate name and the explanation for the abnormalities of heart and/or lung functions, resulting in symptoms and signs thus compromising functional status and HRQoL, if there is no other obvious reason [10]. The high prevalence of Post-thrombotic and Post-PTE syndromes suggests that they should find a place in VTE classification just as is the case with acute forms. It is a sufficient reason to improve the actual dichotomous separation of VTE (in DVT and PTE only).

Obviously, there is an additional reason. The importance of differential diagnosis between relatively frequent recurrences versus subacute/chronic VTE types is the second reason to incorporate the "not-acute" forms in the VTE classification. The high rate or re-VTE has been known for decades [12,13]. Currently the guidelines cite the cumulative prevalence of VTE recurrences being as high as 13%, 23% and 30% after 1, 3 and 5 years of follow up, respectively [4]. If we perceive that VTE as an acute disease with a high recurrence rate (as it is currently believed), any suggestive symptom or sign will probably be considered as a new VTE episode. This is usually correct, but it is not always because the symptom persistence or worsening can represent (among other causes) not only the VTE recurrence but also the post-PTE syndrome. For example, dyspnea in a patient with a previous PTE —if not arising from other diseases— does not automatically mean that it is a result of a new episode of PTE. It may well be a Post-PTE syndrome.

It may be argued that Post–PTE syndrome and Post-thrombotic syndrome ought to be regarded as subacute/chronic VTE types or as complications of VTE. Their high prevalence (approximately 50% each) following acute VTE events suggests that the term "non-acute" VTE forms is appropriate. Moreover, both Post-VTE syndromes reflect *the same pathologic substrate (thrombosis) in the same organ as previous VTE*; therefore, they can be regarded as *insufficiently cured acute VTE types*, rather than complications. Furthermore, it is probably more useful for practice to recognise them as VTE forms: we have been generally more aware of types of a disease than of its' complications. Additionally, the complications may be said to be rare and this is a potentially dangerous mistake in VTE treatment. Therefore, it would appear to be logical to separate not all, but *only the acute* VTE into DVT and PTE. The current division of VTE into DVT and PTE (although universally accepted) [1-5] is not sufficiently precise and consequently it is inadequate.

To understand that VTE ought to be viewed as a chronic disease [14], our suggestion is to classify it in the following manner: "VTE encompasses both A] acute forms (DVT and PTE) as well as B] subacute/chronic ones (Post-thrombotic syndrome, Post-PTE syndrome and CTPH)." Therefore, the sum of experts' recommendations can be entitled "PTE Guidelines" and not "*Acute* PTE Guidelines". Noting that VTE is not represented only by DVT and/or PTE, but also by subacute/chronic forms, we can improve at least four practical and scientific approaches: 1) The knowledge of Post-PTE syndrome can be expected to rise dramatically; 2) Increased awareness of the high prevalence of the Post-PTE syndrome would lead us to study it far more intensively (in order to improve its prevention); 3) We can better prepare future thromboprohylaxis for patients with previous VTE during risky occasions, such as prolonged immobility. It is important, particularly for patients with post-VTE syndrome(s) because their frequent residual thrombosis may represent the additional risk for re-thrombosis; and 4) We may better realize that plausible symptoms

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