

# A flammable idea: A review of burns from electronic nicotine delivery systems [ENDS]



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#### **INTRODUCTION**

**Electronic nicotine delivery** systems [ENDS] or e-cigarettes are devices that heat a solution which contains nicotine, propylene glycol, or glycerine with added flavour. E-cigarettes ('vapers') comprise a battery powered atomizer that produces vapour for inhalation from refillable tanks. A fashionable but potentially unregulated trend in the youth (mostly male) and first time smokers has shown an increase in injuries and burns from 0.6% to 12.6% of the population between 2009-2014[1].

Thermal runway occurs when the reaction rate and subsequent temperature increase causes the charged flammable organic components to short circuit. These exothermic reactions produce a variable degree of burns and injuries ranging from facial fractures, burns and loss of limbs.

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Figure 1 - A partial and full thickness burn to the right groin from an spontaneous explosion of the ENDS.

### A growing public health concern

Most explosions related injuries have not appeared in the peer reviewed literature, but a recent report by the 2014 US fire administration concisely documents many incidents [2]. Most published data have identified incidents primarily through media reports, however, an increase since 2009 has been noted from literature, case reports and federal agencies.

There is no international consensus or regulation of these devices. There is a need for manufacturers to provide clear instructions about safe use regarding electrical standards. Future consideration regarding thermal cut offs, overcharge protection and overpressure relief mechanisms will need to be considered.

#### Variable burns and regulations

The exothermic reaction from ENDS can produce variable depth of burns from battery failure. The majority of the injuries have occurred spontaneously in the user's front pants pocket, followed by face and hand. The injuries ranging from partial to full thickness burns with a TBSA of 1 - 15% and in some cases fractures and loss of limb [3]. Most of the data is through media reports.

A focus on improvement on product design and manufacturing standards with clear warnings about safety is warranted on national and international regulatory companies and bodies.

#### **REFERENCES**

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