



Backgrounder to position statement: the danger of tap water scalds

December 2010

Scalds due to hot tap water are a cause of severe injury in very young children and a source of tremendous pain, requiring multiple hospitalisations and lengthy treatment and resulting in permanent disability or disfigurement and even death. Hot bath water is responsible for the highest number of fatal and severe scalding injuries among young children. For example, every year in the United Kingdom approximately 500 children under the age of five are hospitalised due to a severe scald caused by bath water, over 20 of who die of their injuries. An additional 2,000 are seen in the emergency department for bath water scald injuries. Scalds can be expensive to treat due to their severity--as much as 290,000 € per severe injury.¹

The exposure time required to produce a 3rd degree scald depends directly on the water temperature.² According to one study at 55°C and higher a child's skin burns in one quarter of the time it takes to burn an adult's skin, as it is thinner and more vulnerable.³ Unfortunately there appears to be a low level of awareness in the general population that household tap water can lead to injury as most people are not aware of the short exposure times that can result in serious burns.⁴

Most scalds are unintentional but it is unknown exactly how many tap water scalds are due to child abuse or neglect. Research suggests an inequality in tap water scald rates, with children of lower socioeconomic backgrounds having higher risk of severe scald injuries at home and higher rates of scald related hospitalisation than children from higher socioeconomic backgrounds.¹

Evidence-based research has proven that tap-water scalds are preventable through a variety of prevention measures based on education, engineering and enforcement.

Active measures to prevent tap-water scalds include:⁵

- Educating caregivers about the danger of hot water,
- Continuous on-site supervision of young children and children with cognitive underdevelopment or impairments while near faucets or in bath water,
- Testing the sink or bath-water temperature before allowing children contact with the water,
- Forbidding the use of the bathroom as a play area,
- Filling the bathtub with cold water first and then adding hot water,
- Facing children away from the tap handles in a bathtub or sink
- Not allowing an older sibling alone with a younger sibling near faucets or in bath water.

However, the most effective way to prevent tap water scalds is to remove the hazard altogether through passive prevention.

Effective passive prevention methods to limit the temperature of tap water include:⁶

- Reducing the thermostat setting of gas and oil water heaters in single-family units

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- Installing a master thermostatic mixing valve at the water heater
- Installing thermostatic mixing valves in bathrooms

A thermostatic mixing valve is a temperature-limiting device which can be fitted to a water heater, spout or tap to mix in cooler water as needed, while allowing water to be stored at a higher temperature.^{3,7} The standards for such products are covered under European standards for sanitary tapware EN:1287:1999 and EN 1111:1999.⁸

Lowering the water heater temperature may slightly increase the risk of legionella bacteria developing, which can lead to Legionnaires' disease, a form of pneumonia.⁹ However, in one study despite the fact that up to 30% of hot water systems tested were positive for legionella,¹⁰ it has not been possible to demonstrate a causal link between the hot water heater temperature in the home and the disease.¹¹ There is however strong evidence of the link between hot tap water and scalds.

A 2007 WHO report on legionella prevention and water safety plans recommends that to balance out the risks of tap water scalds and legionella, water heating units should be set at approximately 60° Celsius, and the water exit point (the tap) be set at 50° Celsius. The report further indicates that although legionella can survive for a few hours at 50° Celsius, exit point (tap) temperatures can safely be kept even as low as 45° Celsius if a thermostatic mixing valve is installed, and that there are other control measures which can be used in combination against legionella besides temperature regulation for those who wish to keep the entire water distribution system cooler, such as the use of biocides and periodic flushing of the water system.¹²

A number of states in the United States require water heaters be installed with the thermostat at 50°C and studies there showed that the legislation has led to a reduction in tap water scalds with no increase in cases of Legionnaires' disease.^{13,14} In 1998, Western Australia adopted legislation to ensure that hot water shall not exceed 50°C for all new buildings and all new hot water installations.¹⁵

A 2003 Canadian review of the scientific evidence on both household legionella risk and tap water scalds concluded that pre-setting domestic hot water heaters to 50°C should not increase the risk of contracting Legionnaires' disease in adults or children. The review therefore recommended lowering the tap water temperature in private homes to 49°C or less and the province of Ontario implemented such a law in September 2004.¹⁶

Furthermore, in relation to health and environmental impact, it has been shown that reducing the temperature at which hot water is delivered can assist in the reduction of greenhouse gas emissions as well as reduce energy costs, contributing to current global targets for sustainable consumption and climate change.¹⁷

Currently there are no European-wide regulations concerning the maximum temperature of domestic hot water at the point of delivery to the consumer.⁹ However, some EU countries have moved forward with regulations to set a maximum temperature in order to reduce the number of tap water scalds. France, Scotland and Sweden have laws limiting the maximum temperature of hot water in the home (France specifies 50°C in bathrooms and 60°C in other rooms for all homes; Scotland specifies 48°C in new and refurbished homes and Sweden specifies between 50°C and 60°C and 38°C if there is a particular risk of accidents).¹⁸⁻²² England and Wales'

recently adopted legislation is in line with Scotland's, and Northern Ireland is currently in the process of implementing similar legislation.^{18,19}

In other European countries there are only *recommendations*. Denmark and the Netherlands suggest limiting the water temperature to between 52°C and 57°C at the source combined with renewal of the water in the tank 2.5 times per 24 hour period to prevent bacteria.⁹ In Norway 38°C is the recommended limit for hot water within kindergartens, homes for the disabled, and otherwise 55°C is suggested.²³

In summary, a balance must be found between preventing serious tap water scald injuries and exposure to legionella for those susceptible. Given that currently there is no evidence of a link between Legionnaire's disease and domestic water temperatures, and that the risk of severe scalds is conclusive and proven by the continued tragic number of cases, the uptake of evidence-based measures to address the risk of scalds is justified.

The European Child Safety Alliance position statement on tap water scalds can be found at www.childsafetyeurope.org

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