



Dirty kit is no 'badge' of honour'

Numerous studies have proven that firefighters are at higher risk of contracting cancer than the general population. What can we do to minimise the risk? Jemma Dempsey reports.

In 1775 an English surgeon noticed a common condition affecting teenage chimney sweeps who had spent years scurrying up and down chimneys since their early childhood. On closer investigation Sir Percivall Pott noted the sweat running down their bodies had caused soot to accumulate around the skin of the scrotum. Soot wart, as it was called, turned out to be the first reported form of occupational cancer. Chimney sweeps weren't alone; firefighters were similarly exposed and, while the 1800s saw great strides in the development of fire brigades and organised firefighting, protective gear was rudimentary at best. Later, in 1922, it was shown that coal soot was a carcinogen. Firefighters are statistically at high risk to contract cancer at some stage in their life.

The research

The problem is finding definitive proof. Last September, the BBC reported that three firefighters who were on duty at Ground Zero when the Twin Towers collapsed, all died from cancer on the same day. But doctors in the US say it can't be proven the cancers were caused by exposure to toxins, even though thousands who helped the 9/11 rescue effort were later diagnosed with various illnesses, including cancer.

One of the most comprehensive studies to look at cancer rates within the firefighting community has just been completed in Australia. It was conducted at Melbourne's Monash University and looked at mortality and cancer among more than 230,000 current and former firefighters. With the help of a comprehensive national cancer database, it found that firefighters faced a higher risk of some cancers. Lead author and associate professor Deborah Glass said: 'In particular, we found that paid firefighters were at greater risk of melanoma and prostate cancer, especially after multiple exposures or prolonged service.'

But prostate cancer is very common in the country, so causation is quite difficult to demonstrate, echoing the point of the American medical community after 9/11.

However, Professor Glass also said: 'What we can show is that there is an excess of cancer among firefighters, but we can't say that's because of soot in the air or the way they handled their PPE (Personal Protective Equipment). Basically, you can't diagnose whether the cancer was occupational or whether it would have happened anyway.'

Conversely, a 2006 study conducted at the University of Cincinnati makes for gloomier reading – it found firefighters are twice as likely to develop testicular cancer and have a

The St Peter church fire in 1842, in Hamburg. Unidentified author, published in Magasin Pittoresque, Paris, 1842 (Shutterstock)

Right: a Swedish firefighter loads dirty PPE into the Electrolux washing machine.



Torki



Drycleaning bin and contaminated personal protective clothing bag ready for collection by dry cleaners at a fire station in Perth, Australia.



of exposures, particularly the soot firefighters carry back with them on their faces, hands and under their gear.

Report author Grace Le Masters says it gets sucked into the body through the skin, particularly when firefighters sweat and their pores are open. She says: 'We are concerned that although firefighters may have respiratory protection, they really aren't getting adequate protection from absorption of these compounds through their skin.'

And she concludes: 'Firefighters have told me they come back from fires covered in soot. Often they are too tired to shower, they just fall into their beds and go to sleep.'

The regulations

So what does all this mean for worried firefighters? It's a topic being hotly debated, especially as health and safety regulations differ the world over. The US has NFPA 1851 outlining the care and maintenance of PPE, but it wasn't until 2009 that a truly international standard was introduced – ISO TR21808:2009 – which is a baseline for all countries.

There are strict protocols for decontaminating PPE that has been in contact with blood-borne pathogens, asbestos or known chemicals. But it's a different story after a call out to common structure or vehicle fires which aren't normally considered for their potential health risks. Consequently, the methods used for cleaning and maintaining PPE vary greatly after a call out. Couple this with the uncertainty of not knowing which toxins may have been present and the picture becomes murkier still. With this in mind, the USA's Fire Protection Research Foundation is currently investigating the contamination of turnout gear and effective cleaning procedures.

50% higher risk for multiple myeloma and non-Hodgkin's lymphoma. Professor Glass puts that down to the different age profile of the firefighters concerned and that testicular cancer occurs in younger men and that the more recent groups, who have had access to better uniforms and RPE (Respiratory Protective Equipment), would have less exposure and been exposed to a lower risk.

After the emergency

However, one area the two studies agree on is over the lack of protection during the clean-up phase. Professor Glass notes during the clean-up, firefighters take the gear off because it's hot, heavy and uncomfortable. This, according to the Cincinnati study, leaves them susceptible to a dangerous soup

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Badge of honour

One man who's asked a lot of questions about PPE and how to best to care for it is John Helgesen. A career firefighter from Canberra for 25 years, he recently won a scholarship from the prestigious Winston Churchill Memorial Trust to compare PPE maintenance regimes around the world. He travelled extensively interviewing station chiefs in Japan, the US and the UK, as well as at home in Australia. The picture that emerged was of a piecemeal approach, determined by the availability of PPE, finances and, crucially, attitude.

John notes: 'If you're wearing sparkly clean gear then you're not doing any work. The dirtier you are the more work you've seen and the more experienced you are. It's a badge of honour to have dirty kit.'

Indeed he recalls one visit to a station in Los Angeles where the crew kept a brand new kit in a locker and when inspection time came around that's the one that was brought out.

Helgesen's interest began back in 2008 when Queensland Fire and Rescue started bagging garments involved in firefighting. After being bagged, a PID – a photo ionization detector – would scan the dirty gear for toxins. But its effectiveness was limited.

John says: 'We could see people looked and smelt dirty but it wasn't being picked up by the PID. Through an occupational health and safety group, we basically said if someone can smell you're dirty, your gear automatically gets washed, end of story.'

Clean cab

What became known as a 'clean cab policy' started to take off across the country. In short, firefighters do not get back into the truck with dirty gear on. PPE is bagged and tagged before being taken back to the station where it's either

Breathing apparatus hanging in a drying cabinet.



Reducing that risk

What happens back at the station is as important as what happens immediately after the incident. In Western Australia all new stations being built have walk-in shower areas which can be accessed from outside. Firefighters undress, shower, put on paper overalls and then get back into their clothes inside the station.

And what of the dirty kit? In much of Australia it goes off to contract laundries, taking it out of action for up to a week. Manufacturer Electrolux is seeking to make the process easier and over the last year has been rolling out a new system to allow fire departments to clean their own PPE on site in a safe way. Working with the Swedish Healthy Firefighters programme, the company has developed a new way of decontaminating clothing and other equipment exposed to hazardous substances.

The Electrolux Barrier machine means there's never any contact between dirty and clean clothing as the two parts are completely separate. After being cleaned with whichever chemical is needed, the uniforms are taken out and hung in a drying cabinet. The machines don't come cheap, costing anywhere between US \$11,400 and US \$22,800. But it means kit doesn't have to be sent away to be laundered which, Electrolux says, can result in savings of 20-30%. And it's catching on – the barrier system is dominant in the Swedish market and is making inroads in Finland and Norway, with the company in talks with Melbourne's fire department.

Damage and repair

But does clean equal safe? Bristol Uniforms is a firefighting clothing manufacturer based in the UK. It argues that the problem with cleaning on site is that the firefighter isn't in a position to know if any damage has been done to the kit and, consequently, it is unsafe to wear. The washing process is the easy part but a spokesman says it's hard to know if there are any small tears or punctures which allow the heat to get through. To overcome this problem, Bristol introduced a system allowing fire services to lease their PPE, offering a managed service known as its cradle-to-grave concept. Over the course of a piece of PPE's five-to-seven-year lifespan, it is managed and serviced by Bristol.

This new focus on care and maintenance is something few fire departments can afford to ignore but an effective regime means multiple sets of turnout gear, which clearly has financial implications. Better education at fire training college and more stringent protocols on cleaning contaminated gear in the post-fire stage will go a long way to reducing the risks. Indeed the Fire Service College which puts around 4,000 trainees a year worldwide through their paces, drums into firefighters the importance of looking after kit and how to check for broken stitching, abrasions, scratches or tears.

A spokesman says the whole dirty-kit badge-of-honour mentality is a thing of the past. 'There's a very strong health and safety ethos now, especially at the Fire Service College. Because people don't have ownership of their gear, they see it as a tool and to have clean, structurally sound fire gear is important because it's equipment.'

But while the future might be looking brighter, firefighters aren't out of the woods yet. Back at Australia's Monash University, Professor Glass says there's some evidence to suggest shift work itself is a risk, perhaps increasing the chance of breast cancer in nurses and prostate cancer in airline pilots. And, of course, firefighters work shifts. With Forbes magazine this year declaring that firefighting is the most stressful profession in the world, protecting its practitioners has to be one of the priorities of every society,

laundered on site or sent away for cleaning. John concluded: 'Australia is doing good stuff, much of it being driven from the ground up.'

Don Fazio has more than 30 years' experience under his belt and is based in Perth. He is relentless in his pursuit of keeping clean. After a job, gear is double bagged and tagged at the scene. And, if T-shirts and pants are heavily contaminated, they are bagged too. The bags are then stowed in a locker to prevent cross-contamination. Each appliance has a personal hygiene station with a fresh water tank so firefighters can wash their faces, hands, arms and necks. Spare clothing is carried so they can get changed on site before getting back into the vehicle. But it doesn't stop there.

Don said: 'When dealing with motor vehicle fires, in the past we would park the appliance close and basically dance about the smoke as we extinguished the fire, taking in the more than an occasional breath of smoke and toxins. Now we park the appliance several metres away. One firefighter will hit the fire with a jet of water from a safe distance in clean air while a second will don his breathing apparatus (BA) and then take the hose and continue extinguishing what's left.'

If there's any risk the PPE is contaminated, it's bagged and tagged on site. BA harnesses are washed back at the station, an uncommon practice until a few years ago, and the face masks are kept in a heavy duty denim bag on the appliance to limit contaminants and pathogens getting inside.

Don said: 'We try our hardest to minimise health risks. This is an unwritten rule for us.'

And that's because he, like most long serving firefighters, has lost colleagues to cancer and is ever mindful of the risks involved. His parting thoughts are: 'Working in this field is like driving down a motorway at speed. If you're reckless and don't take due care and precaution you will eventually meet with disaster. If you take all care, follow procedures and keep the risks as low as possible, you should reach the end of the journey pretty much unscathed. However, with every journey sometimes things beyond your control will happen. But it's a job I love. I accept the risk.'