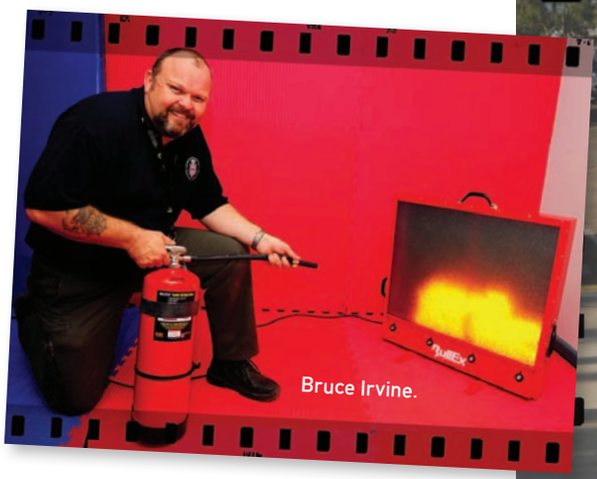



Fire training in action.

If a fire broke out in your facility would you know how to handle the situation? Healthcare security adviser, BRUCE IRVINE, explains the basic steps to containing a blaze.

Fire training put to the test

Having worked for many years in healthcare security, I became alarmingly aware that a growing number of healthcare staff lacking confidence in the practical use of fire extinguishers.

In the past, staff were more skilled and experienced in dealing with fire emergencies and there were two reasons for this: Firstly, there were more fire incidents: Construction materials, equipment, furnishings and work practices existed that made it more likely for there to be a fire. Back then, buildings were mostly constructed using combustible materials that were not fire-resistant and/or did not include a fire retardant. Add to this other building products, equipment and furnishings that were a high fire risk; no electrical safety switches; smoking by staff, visitors and patients was permitted within buildings; and building fire alarm systems and designs were rudimentary.

Secondly, staff received hands-on extinguisher training in dealing with these real fire events: Extinguishing capabilities were basic compared with today and consisted of water extinguishers (soda acid), fire hoses and the bucket of sand.

Revisiting the history books, the soda acid extinguisher used the reaction between sodium bicarbonate solution and sulphuric acid to expel pressurised water onto a fire. A vial containing concentrated sulphuric acid was suspended in the cylinder. Depending on the type of extinguisher, the vial of acid could be broken in one of two ways. One used a plunger to break the acid vial, while the other released a lead bung (stopper) that held the vial closed. Once the acid was mixed with the bicarbonate solution, carbon dioxide gas was expelled and thereby pressurised the water. The pressurised water was forced from the canister through a nozzle or short length of hose. The associated risks were: Residual acid in the stream; electrocution; and not being trained in the risks.

The fire hose consisted of a stand pipe (a removable fire hydrant that the fire brigade still uses) to which was attached a lay-flat hose and nozzle. The associated risks were: Electrocution; water hydrant pressure would make the hose difficult to control; and not being trained in risks.

The fire sand bucket or fire bucket was a steel bucket filled with sand which was used to extinguish fires. Typically, fire buckets were painted bright red and had the word 'Fire' stencilled onto them in white lettering. They were placed in prominent positions in rooms or corridors. They were a basic, low-technology method of fighting small fires. The associated risks: Bucket being a useful receptacle often went missing; it would be used a bin for combustible waste; it could not control discharge; and it had to be close to fire to use effectively, risking radiant heat burns.

Today we have far superior portable extinguishers and an Australian standard (AS 2444), that if complied with, ensures the most appropriate type of extinguisher is located to suit the risk it is to combat. All extinguishers, bar one, are charged with nitrogen. This is an inert gas (which will not cause personal injury) that pushes the extinguishing agent (water, foam or dry powder) out of the discharge hoses. The other extinguisher is charged with carbon dioxide (a vaporising liquid). Carbon dioxide displaces oxygen hence temporarily removing one of the elements and thereby disrupting the chain reaction. The CO^2 extinguisher has also advanced since its introduction and instead of being made of cast iron is now constructed out of light alloy. The only risk to the operator today when using an extinguisher is not being taught to use it.

Today we also have fire-engineered buildings that include compartmentations, electrical safety switches, advanced alarm systems incorporating more advanced automatic detectors, an assortment of special services (like smoke purge fans), and a variety of extinguishers for a variety of fire risks. Supporting this equipment are Acts, regulations and standards that have been reviewed and updated over time, resulting in better building products and methods of construction. Unfortunately most of these changes have occurred because of real fire incidents. Fire incidents not only cause property damage but pose very high risk of serious injury and death which can trigger an investigation and possible litigation, apportioning blame, fines and imprisonment.

Our modern healthcare facilities are constructed in such a way that there are fewer incidents of real fires. The alarm and extinguishing systems give our healthcare staff advanced warning of a potential fire event, allowing for a prompt response and adequate time to evacuate. But because we have more advanced fire detection in place today that assist us to comply with legislation and inspections, we can easily be led into a false sense of security in regards to fire safety.

Over time complacency has crept in due to environmental issues, staff workloads and training costs. We have slowly moved toward just 'ticking the box' in regards to practical hands-on fire extinguisher training. Some would validate this by interpreting the various State Fire Safety Acts and Regulations, and the Australian Standards (AS 4083 Planning for Emergencies in Healthcare Facilities and AS3745 Emergency Control Organisation and Procedures for Buildings, Structures and Workplaces), which suggest that only instruction is required to be given. There are no specific requirements in relation to providing practical fire extinguisher training.

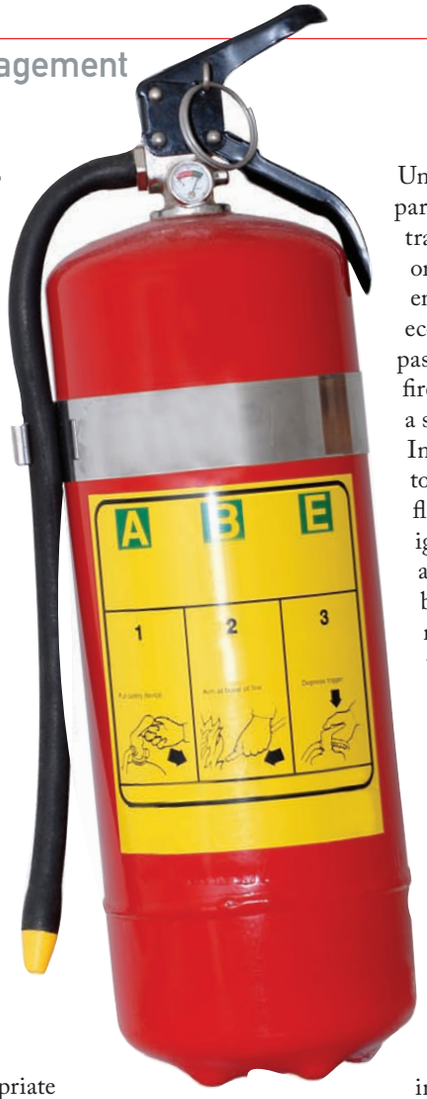
> "I became alarmingly aware that a growing number of healthcare staff were not confident in the practical use of fire extinguishers."

Those that believe practical extinguisher training is unnecessary in a healthcare setting have limited understanding of how difficult it is for an untrained person to use an extinguisher while under duress. Any person under duress will lose function of their fine and complicated motor skills. They only have their fight, flight or freeze responses left, these being their gross motor skills. A system needs to be programmed into their complicated motor skills to ensure they can perform the task of operating an extinguisher under duress. This system or technique is known as the P.A.S.S. technique: Pull the pin; Aim the nozzle at the base of the fire; Squeeze the lever; and Sweep the fire with extinguishant.

This technique needs to be practised and through practice the technique becomes automatic. It is programmed in as part of the complicated motor skills, and is therefore far more likely to be performed successfully whilst under duress. Remember extinguishers are a first response tool. By being used effectively and confidently, they can quickly extinguish a fire in its early stages resulting in saving of life, prevention of serious injury, prevention of damage and/or loss of property, reputation, goodwill and possibly legal action.

So why is it important to know how to use an extinguisher while under duress? Let me go back to the basics to answer this. Two special hazards that occur as a result of fire are smoke and high temperatures. It is not the fire that kills; it is the smoke. Smoke is the by-product of incomplete combustion that contains the deadly gases, carbon dioxide and carbon monoxide. Carbon dioxide causes narcosis (inhalation results in a false sense of wellbeing), and carbon monoxide causes hypoxia (inhalation results in a deficiency of oxygen). These gases, along with various other toxic gases, find their way very quickly throughout a building. Hence, there is a need to quickly extinguish the flame, if this can be done safely, so that the generation of smoke is stopped or retarded and there is more time for evacuation.

Remember, although we have a matrix of fire emergency electronic infrastructure, we cannot always rely on this equipment to not fail. We need to be prepared for any emergency, including system failure.



This means being prepared to respond quickly, efficiently and effectively to extinguish the fire if safe to do so or evacuate quickly and confidently under any circumstances. It stands to reason that if a staff member is confident and practiced in the use of these first aid appliances, it is more likely that they would be successful in their use. This is best achieved by a combination of theoretical and practical training.

Theoretical training should include an explanation of the combustion process. For those of us old enough to remember the fire triangle, depicting the three elements that needed to be present and in the right amounts for a fire to occur. These elements are oxygen, fuel and heat. It was taught that by removing one of these elements the fire could be extinguished. This was appropriate when we only had water in lay-flat hoses and soda acid water extinguishers to combat fires, and when the closest thing to a dry chemical extinguisher back then was the fire bucket.

Today, the combustion process is better explained by the fire tetrahedron which shows that fire requires four elements in order to start and continue to burn – heat, fuel, oxygen and chain reaction. The chain reaction is a self-sustaining chemical reaction called "combustion" that produces continued heat that serves to keep the fire burning. To help illustrate this, the four-sided pyramidal-shaped tetrahedron model was developed. Remove any one of these elements from the fire tetrahedron and the fire will not start or, if already burning, will be extinguished. For example, using a water extinguisher on a fire removes heat. Once all the heat has been removed the fire is out. Using a dry chemical powder (DCP) extinguisher interrupts the chain reaction, effectively extinguishing the flames, but there is still risk. There is still fuel, oxygen and heat, so there is the potential for the fire to reignite given the right environment (gust of wind) until the heat dissipates. CO^2 extinguishers displace oxygen. This again interrupts the chain reaction, but like with the dry chemical extinguisher, the heat has to dissipate or be removed for the fire to be considered out.

Until recently, participation in practical training within any organisation caused environmental and economic issues. In the past, to conduct practical fire training, you needed a safe area or fire ground. In this area there needed to be a fire tray in which flammable liquid was ignited or, alternatively, a rudimentary LPG burner was used and manually controlled by the instructor. Staff would put the fire out with a dry chemical or CO^2 extinguishers.

It has proven over time to be increasingly difficult to release staff to attend practical training at a fire ground. In addition is the cost of the flammable liquid, environmental impact from the smoke generated as well as the actual cost and environmental impact of discharging the extinguishers.

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CO^2 extinguishers have been used for training instead of dry chemical extinguishers; however these extinguishers are the most uncommon type installed in buildings. They are only normally located near expensive miniaturised electronics (for example radiology department imaging equipment, nuclear medicine equipment, and PABX, server and communication rooms). This is because the fine powder of the dry chemical extinguisher can find its way into the electronic components, and can cause malfunction and or serious damage.

The CO^2 extinguishers are more expensive and difficult to refill than the dry chemical powder ones and the discharged CO^2 gas is not environmental friendly.

These extinguishers can only be refilled by an authorised company, off site and at a significant cost. The disposal of the fuel/water mix also poses a problem. This liquid cannot simply be tipped out onto the ground or poured down a drain. It must be removed appropriately from site following EPA guidelines. This creates additional costs and other inconveniences such as extra travel, storage and decanting. The LPG burner, although environmentally friendly, relies on the instructor to isolate the gas by physically turning off the source once the fire is put out. A potential re-ignition risk exists if the instructor becomes distracted and fails to isolate the gas source. All these concerns can and have become a deterrent to delivering practical training. But the unseen cost is the loss of important staff skills.

Gas and digital fire extinguisher training simulators are available on the market today. These negate the need to use flammable liquid, carbon dioxide or dry chemical extinguishers thereby eliminating the issues mentioned above, and allow the organisation to conduct practical fire extinguisher training at a negligible cost with flexibility of training environments. The simulators consist of controlled fire environments and include extinguishers that are also part of the simulation. These can simply be refilled or reset in the training area by the instructor.

I recently facilitated the purchase of both the gas and the digital simulator for an organisation and, as a result, it can now offer practical training anywhere. Training sessions can be conducted in confined areas at site-specific locations such as the actual office/ward/storeroom environments by using the digital system. This means training people in first attack fire fighting in their workplace where they may actually one day be faced with a fire situation.

BullEx Australia has won the 2008 Fire Awareness Industry award in Victoria for its innovative fire training systems. The company's training systems have allowed a growing number of small and large organisations to provide ongoing practical fire extinguisher training at negligible cost. I have used this equipment to train many staff and the feedback is overwhelmingly positive, with the system's in-built timers tend to create a sense of competition amongst the trainees which encourages participation. The main comment received was that staff now felt confident in being able to competently operate a fire extinguisher.

By having these staff confident in the use of fire equipment the likelihood of staff being able to extinguish a real fire is significantly raised. Healthcare providers are also able to potentially avoid the fall out from a fire which can range from injury and damage to government and media attention. H&A