

**Demonstration Team Risk Assessment Form**

**Super Cells**

**Activity**

An interactive science show about health and medicine featuring volunteering and demonstrations as follows:

- UK Spread: An approximately A2 sized map of the British Isles is touched by the presenter triggering soft glowing sparks that spread across the landmass on the map, representing the spread of an infectious disease.
- Cell Factory: A pop up tent represents a generic cell, while the presenter explains how the nucleus is like a computer containing instructions and the cell has the “machinery” to produce “tools” such as proteins for normal running of the body.
- Balloon Antibiotics: A volunteer is selected to act as an antibiotic. Balloons represent bacteria, white balloons for good bacteria, yellow for bad bacteria. Wearing filtered goggles to confuse them, the volunteer is asked to pop the bad bacteria, hopefully popping some of the good ones too.
- Cell Factory Return: A volunteer is found to be a virus. They wear a bubble coat, to represent the protein jacket of a virus. They are also given an “RNA” USB drive, which they slot into the cell computer, causing it to produce more bubbles, or proteins to build new viruses.
- Sneeze Gun: Two volunteers are selected, one of which could be a teacher. The Teacher is asked to wear a waterproof poncho and a specially adapted face shield. The other volunteer is given the “Sneeze gun”, an adapted stomp rocket which will spray water when fired. This is fired at the teachers face and makes the face mask appear with green splatters on, to represent the potential presence of germs.
- Snot Demo: A volunteer is selected and presented with a selection of beakers and a box with a tap on. They are told that when the tap is switched on the amount of mucus an adult human produces in a day will come out and to select the correct beakers to catch it. When the tap is turned on 2lts of green water pours out, the total volume of all the beakers, hopefully to their surprise.
- Antibody Bingo: 9 Volunteers are invited to the stage. Each person is given an “Antibody” a seemingly random shape that may or may not match the shape of a virus’ surface. The audience try to identify the right one till it is found. At which point many copies of the correct shape are revealed.
- Cell Factory Return Again: The presenter returns to the cell to show how different types of vaccines use the mechanisms of virus reproduction to teach the immune system to protect us from viruses and even learn to fight other problems, including cancer cells.



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- Cancer Identification: A volunteer is asked to act as the immune system and identify and destroy balloons marked as cancerous. At first they cannot do it, but a new tool, made by the cell following Human made RNA instructions, helps the volunteer identify the right balloons to pop.
- Finale: A large balloon is automatically inflated, becoming a looming threat. The presenter destroys the balloon using the “tools of science”, sending confetti into the air.

### Method Statement

- **UK Spread:** Fire alarms are likely best isolated, especially in small spaces. Presenter should assess and discuss in the venue. Location of fire extinguishers should be noted.  
The British Isles map is laid flat on a table and the lid with the map opened up. An approx. 50cm length of 0000 wire wool is pulled off the roll. Its width is teased out to cover the width of the map and placed on top of the chicken wire in the box. The map lid is closed and the whole box lifted up and the stands unfolded so it sits up, slightly angled (Angle is set by the stands). A heat proof tile is sat on the table between the stands and below the chicken wire. A “Battery glove” is placed behind the map with the battery box switched to the Off position.  
When the show is beginning the presenter can put on the glove and switch the battery box to the On position.  
As the presenter introduces the idea of a spread of infection they can select a location on the map, ideally the location of the show, but not necessarily. They simply touch that part of the map with the tip of their index finger, where the wires are exposed. This will ignite the wire wool, triggering the gentle smouldering of the wool, giving the effect of a spread across the map. The wool must be allowed to burn out before moving on.
- **Cell Factory:** The pop up tent is unfolded from it’s carrier. It should be placed with the large opening to the rear of the stage area. Inside the prop laptop, RNA USB drive, and tools are placed with easy access for the presenter (If a suitable table is available at the venue, this could be placed just inside).  
For a later demonstration a battery powered bubble machine with bubble fluid already in is placed facing out of a hole pointed towards the audience so that bubbles land on audience members rather than straight onto the floor. When describing the cell structure the laptop is the nucleus containing DNA, and the USB is the RNA to transfer information to the machinery in the cell to produce the tools, which represent proteins for use around the body.
- **Balloon Antibiotics:** A set of yellow and white balloons are inflated and taped to the back edge of a table, or other clear area, they could be in a row or bunched up, then covered with a cloth. A single yellow balloon is inflated and placed somewhere separate and visible. On a table a pair of red filtered goggles, ear defenders and a spike with a handle are placed.  
A volunteer is selected from the audience and shown the yellow balloon, which is explained to be a bad bacteria. The volunteer will be the antibiotic, they are asked to wear the goggles and ear defenders, then they are given the spike and asked to pop the yellow balloon. Then the audience are told that some bacteria are good, and these could be white balloons, so the volunteer is reminded to burst the yellow balloons, then the multiple balloons are revealed and they are asked to pop them. Because of the filtered goggles it



should be difficult to tell them apart and the volunteer should pop some of, if not all the white balloons as well.

- **Cell Factory Return:** The cell factory should be set up with the bubble machine in place. The bubble jacket and an RNA USB drive are placed on a table. A volunteer is selected and asked to wear the jacket as it is explained that this is the protein jacket of the virus. They are given the USB drive and it is explained that this is the viruses RNA, the instructions to make more virus. They are taken over to the Cell Factory and the laptop is brought out, the audience are reminded that it transfers information to the machinery using an RNA USB drive, but the virus has it's own RNA drive, which interrupts normal operation. The bubble machine is then switched on to represent how the cell is now producing parts to create more virus.

The bubble machine should not be allowed to run for too long.

- **Sneeze Gun:** The poncho should be removed from it's pouch and placed somewhere accessible, along with the adapted face shield. The cylindrical sponge for the sneeze gun should be soaked in clean water and placed all the way into the barrel of the sneeze gun, with the tubing neatly coiled under the table and the stomp rocket pump placed on the floor under the table too. Two volunteers are selected, preferably a student and a teacher. The teacher is given the poncho to wear and the face shield, which can be raised till needed, as it blocks vision.

The student volunteer is given the sneeze gun, told to aim at the teacher's face, from approximately 50cm away, and told they will be given a countdown and then they can stomp on the pump box. The teacher is instructed to put the face mask down and hood up.

A countdown is begun.

When the student stamps on the pump box air will be pushed rapidly past the wet sponge, spraying drops out that will hopefully land on the mask, turning sections of the white face shield green. The Teacher is encouraged to turn to the audience and the green speckles pointed out. Both volunteers are thanked and the teacher helped out of the poncho.

- **Snot Demo:** Some tissue should be nearby to this demo as spillages are likely. In a jug 2.5 ltrs of water are measured and a few drops of green food colouring are added. The "snot tap" is placed on a table making sure it is stable, with the tap facing the audience area. The green water is then poured into the hopper on the back up to the fill line. Below the tap the plastic box is placed to catch any spillages. The selection of beakers, ranging from 5ml to 1000ml, and totalling just over 2ltrs, are laid out to the side of the snot tap. A volunteer is selected and informed that when the tap is switched on the daily average of mucus from an adult human will come out and their job is to select from the beakers how much snot they think will come out. Language should be used carefully to imply that it's about choosing one beaker, without explicitly saying that.



When they have chosen they are instructed to place their beaker under the tap and the presenter switches the tap on. As the water approaches the top of their selected beaker the presenter suggests they select a second beaker. This process is repeated until the tap runs dry, having released 2 ltrs and all the beakers should be full, minus spillages.

- **Antibody Bingo:** The virus surface shape is stood up on a table using its fold out stands. The antibody shapes are in a pile nearby, with the correct shape (Currently light blue) placed at the bottom. Copies of the correct one are piled up somewhere nearby, but out of sight.

9 Volunteers are selected and asked to stand in a line, each volunteer is given an antibody shape, with the correct one going to the last in line. Perhaps with audience guidance, each volunteer tries to match their shape to the virus surface, until the correct one is identified. At this point all the copies of the correct one can be revealed. Antibodies are collected in and volunteers thanked.

- **Cell Factory Return Again:** The presenter returns to the cell factory and explains three types of vaccine following the cell factory analogy. The original virus RNA USB will be left on a table after the previous cell factory demo alongside the bubble jacket. Also on a table are 2 more RNA USBs of different colours. One to be the RNA of an adenovirus, and one to be used as Messenger RNA. There is a padded envelope on the table.

A volunteer can be selected to wear the bubble jacket and hold onto the original RNA USB.

The presenter explains that the original vaccines meant giving someone a small amount of the virus being vaccinated against.

The second method is to take a harmless virus and replace its own RNA with an edited one, so the presenter can swap the Virus' USB drive with a new one. The third method, mRNA, is to forget about the virus (the volunteer can be sent away) and the mRNA USB can be placed into a padded envelope and posted directly into the Cell Factory.

- **Cancer Identification:** Five or six balloons of the same colour are tied to a string. Some, but not more than half, of them are marked with UV ink with a large C, or perhaps an X. They can be hidden away in the cell, or suspended somewhere out of the way for the duration of the show. A UV torch is placed inside the cell factory and an RNA USB stick is on a table somewhere, along with eye protection and ear defenders. The spike from the antibiotic game is also on the table already.

A volunteer is selected to act as the immune system. They are given the eye protection, ear defenders, and the spike. The string of balloons is revealed as the presenter explains that all the balloons are human cells, but some have cancer. They ask the volunteer if they can tell which. They shouldn't be able to. The presenter explains that with a new RNA USB stick, we can instruct the cell to create a new tool, the presenter takes the UV torch from the cell and

hands it to the volunteer. Now the volunteer can identify the cells that are marked as having cancer and pop them with the spike. The volunteer is thanked, items taken back, and the string put out of the way.

- **Finale:** A handful of confetti is placed in an 18” balloon. This balloon is gaffer taped to the nozzle of an electric balloon inflator, which is plugged in and the plug turned on, but the inflator left off. At the end of the show the presenter the presenter speaks about how viruses and bacteria are constantly evolving, creating new and dangerous illnesses. They then switch the balloon pump on. As the balloon inflates the presenter puts on the eye protection and ear defenders from the “Cancer Identification” demo, and says that thanks to science we are constantly developing new tools to protect us from these threats. They burst the balloon, switch off the pump, and thank the audience.

Likelihood		Severity of impact		Current risk
Certain	5	Death or total destruction	5	<b>Multiply Likelihood and Severity of impact to get Current Risk rating</b>
High	4	Major injury or damage	4	
Medium	3	Serious injury or damage	3	
Low	2	Minor injury or damage	2	
Very low	1	Negligible	1	

Action Rating	
<b>10 and above</b>	The work is too dangerous and should not be undertaken
<b>8 or 9</b>	The work is high risk. Those undertaking the work must be fully competent and experienced for the type of work, equipment to be used and fully understand all risks present.
5 or 6	Moderate risk. Workers must be fully competent for the type of work and risks present, or under competent supervision.
4	Low risk. Those undertaking the work must be aware or be made aware of the risks and mitigation measures required.
2 or 3	Slight risk. Those undertaking the work should be aware or be made aware of the risks and mitigation measures required.
1	Insignificant risk. Activity suitable for all workers

**ACTIONS NEEDED:**

Action	Y/N	Fire Extinguisher Type	Y/N
Fire Alarms Isolated	✓	CO2	✓
Ventilation		Dry Powder	✓
Restricted Access		Water Spray	✓
Ensure everyone knows evacuation routes		Water Jet	

**Risk assessed by:** Dan Plane  
**Date of last review:** March/2024  
**Review date:** February/2025

Those at risk (please tick)	Ri Staff	Contractors	Tenants	Visitors	Others
	✓			✓	✓

Hazards	Mitigation	Likelihood	Severity of impact	Current Risk
Wire wool is easily ignited, presenting a risk of fire.	When stored wire wool will be kept in a sealed, insulating plastic bag. Spare 9v batteries will be kept separate and the battery glove must be left switched off, and stored away from the wire wool.	1	4	4
Deliberately igniting the wire wool will present a fire risk.	The wire wool is held on chicken wire in a flame proofed frame. The setup must be put on a heatproof tile to catch any sparks that drop.  Presenter should be aware of the nearest location of appropriate fire extinguishers (CO2, foam, or water spray)	2	3	6
Burning wire wool will create smoke, potentially triggering smoke detectors	Alarms should be isolated if possible. Presenter to discuss with site staff options of ventilation and detector sensitivity.  Note: this is a matter of convenience rather than an actual H&S risk.	3	1	3
Igniting the wool with a battery presents a risk of burning to the presenter	Presenter is trained in handling the battery and igniting the wire wool safely. If using the glove, it is a heat proof glove for added protection. By igniting the wool at arms length, sparks do not present a risk to the presenters eyes.  Demo should be performed at least 1m from audience members	2	1	2
Spilled water will present a risk of slipping	Any spillages must be cleaned up immediately	2	2	4
Bubbles popping on the floor could leave a very slippery residue	The bubble machine should be positioned to send bubbles over the audience, so they, and their clothes absorb most of the fluid.  The machine should also not be left running for more than a minute at a time.  The presenter should keep an eye on the floor around the bubble machine	3	2	6



	and immediately block off or clean up any slip hazards.			
Use of the spike could result in injury to volunteer or presenter	<p>Presenter is to constantly manage the volunteer. The volunteer will be wearing eye protection and warned to be careful with the spike.</p> <p>To prevent the presenters hands from being accidentally stabbed while bursting balloons, there should be plenty of string between the presenter and the first balloon. The presenter should also be sure not to stand directly behind any balloons that are being popped.</p>	2	2	4
Bursting balloons result in loud noises, potentially damaging hearing.	<p>Volunteers being asked to pop balloons will wear ear defenders. The presenter can wear a pair during the antibiotic and cancer demos, but must wear a pair when popping the large balloon for the finale.</p> <p>It will be made clear to audience members that balloons are going to burst so that they can cover their ears. A verbal warning will be given during the finale.</p>	3	2	6
Bursting balloons may send rubber flying through the air presenting a risk to eyes.	<p>Volunteers asked to burst balloons will wear eye protection. When bursting the finale balloon the presenter will wear eye protection.</p> <p>Demonstrations with balloons bursting will be performed at least 1m away from audience members.</p>	2	2	4
Confetti on the floor may present a slipping hazard.	Confetti should be swept up immediately after the show. Presenter to be aware of it and potentially stand guard in any heavily covered areas while pupils leave the hall, if they need to walk past those areas.	1	2	2

**PPE Requirements**

Item		Item		Item		Item	
Flameproof overalls		Gloves contact	✓	High visibility		Waterproof clothing	
Hardhat		Dust Mask		Gloves chemical		Wellington boots	
Hearing protection	✓	Mask chemical		Safety shoes		Sunscreen	
		Laboratory Coat		Eye protection	✓		

**Environmental Risks**

Risks to the space, furniture, clothing, or other property in the areas involved in the activity

<b>Room/Space:</b>	Venue TBC						
Smoke	✓	Sparks	✓	Paint/Dyes	✓		





Steam		Fumes		Impact		
Dust		Water	✓	Cutting		
Heat	✓	Oil				
Fire		Slime				

Likelihood		Severity of impact		Current risk
Certain	5	Irreparable Damage	5	<b>Multiply Likelihood and Severity of impact to get Current Risk rating</b>
High	4	Major damage	4	
Medium	3	Serious damage	3	
Low	2	Minor damage	2	
Very low	1	Negligible	1	

Action Rating	
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<b>8 or 9</b>	The work is high risk. Those undertaking the work must be fully competent and experienced for the type of work, equipment to be used and fully understand all risks present. A process for repair or clean up of the damage must be prepared and in place.
5 or 6	Moderate risk. Workers must be fully competent for the type of work and risks present, or under competent supervision. A process for repair or clean up of the damage must be prepared and in place.
4	Low risk. Those undertaking the work must be aware or be made aware of the risks and mitigation measures required. A process for repair or clean up of the damage must be prepared and in place.
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1	Insignificant risk. Activity suitable for all workers

Hazards	Mitigation	Likelihood	Severity of impact	Current Risk
Food colouring in the water could potentially stain carpets or fabrics.	Water should not be coloured too intensely. Any spillages should be cleaned up immediately. Fabrics exposed to coloured water should be thoroughly rinsed with clean water.	1	2	2
Falling sparks from the UK Spread demo could leave burn marks, especially on fabrics.	Demo should be performed on a solid, hard top table. A heatproof tile will also be placed below the burning wire wool to catch sparks.	2	2	4
Smoke from the UK Spread demo could potentially leave a smell in very absorbent surfaces.	Not too much smoke is released, but the demo should be performed in large spaces (school halls, etc). Presenter should think about ventilation, especially if in a smaller space.	2	1	2