

In this article >>> *The Six Stages of Extrication*

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Advancing Professional Rescue

Extrication



Road Traffic Collision >>>

A Road Traffic Collision (RTC) is similar to any other incident attended by the Emergency Services, in that a dynamic process is followed involving a team of professionals with complementary backgrounds and skills, who share a common goal. They will exercise a concerted physical and mental effort to assess and evaluate a given situation and plan for the agreed outcome. This is accomplished through collaboration, open communication and shared decision-making.

‘Collaboration, open communication and, shared decision-making.’

This can be in the form of a multi-agency effort or just involving one particular Service. Either way, individuals will perform tasks for which they have been trained, in line with standard operating procedures, completed in a logical sequence which is intended to bring the incident to a timely conclusion.

‘Team Approach – A multidisciplinary, structured method of using individual skills and experiences collectively to achieve a common goal.’

In the case of an RTC, the ‘Team Approach’ is

well documented. Six distinct stages have been identified as clearly defined steps that should be taken to bring the incident to its fruition, while still providing the flexibility that allows for the many different situations that you may face.



The principles of the ‘Team Approach’ are to establish clear objectives, respect and to understand each other’s roles, collaborate to work as a single unit and, maintain effective communication. By following these principles, and the six phases the ‘Team Approach’ provides, it gives a multidisciplinary and structured way of using an individual’s skills and experience collectively, to achieve a common goal. The goal is, while focusing on their clinical needs, to safely

remove the casualty from the vehicle in preparation for being transported to definitive care.

By following the six stages, you can adapt to your given situation, while still keeping an emphasis on safety and maintaining a casualty-centred focus. The overall aim of the 'Team Approach' is to provide a systematic working environment to ensure a safe and effective, casualty-centred rescue. The six phases are complimented by pre-determined roles which include an Incident Commander, Tool Operators and Medics, all of which have pre-determined dedicated tasks.

Although the six phases are intentionally provided in a specific order, they are intended to be fluid and the sequence in which they are completed, or if they are completed at all, may vary depending on several factors.

Principally, this will be dictated by the condition and location of the casualty. Regardless of the order of your actions, remember SAFETY must always come first.

Safety and Scene Assessment >>>

As already mentioned, safety is the priority at any incident, and it must remain the case for the full duration of the incident, even during the equipment make-up stage. While safety is

everybody's responsibility, the Incident Commander has overall liability and must take control of the situation from the outset. This will generally start with ensuring that the scene is protected from further collisions. Once satisfied that the scene is preserved, the Incident Commander will then complete a rapid preliminary assessment to identify what is involved and any significant hazards that are deemed to present an immediate danger to emergency service responders, members of the public or the casualty. This could include a fire, a hazardous material or other risks of a similar magnitude.

'Safety is everybody's responsibility.'

Naturally, mitigating the risks from these hazards must take precedence over other activities. At this point, the Incident Commander will also consider the resources that will be required to bring the incident to its fruition, including the need for any specialist equipment, such as heavy lifting or additional rescue equipment.

Once satisfied that there are no immediate risks present at the scene and any additional resources have been requested, the Incident Commander should ensure a more detailed outer scene survey is completed. In most cases, this will mean completing a full 360-degree assessment of the scene covering the point of impact to the vehicle's final resting position. This outer scene survey includes checking the surrounding area for further hazards and casualties that may have been ejected from the car or self-released. Where the Ambulance Service is not in attendance, it is good practice for the medic to accompany the Incident Commander during this inner survey so casualties can be triaged and prioritised accordingly.

Dependent on the situation the Incident Commander may choose to delegate the task to a member of their crew.



An inner scene survey must also be carried out. Generally, this is completed by the Incident



Commander. This is the point where the position and number of any casualties are confirmed, and an initial assessment of the vehicle is completed. This will include identifying hazards that may impact on the rescue process

such as fuel types and leaks, vehicle construction, Supplementary Restraint Systems (SRS) and unsecured loads. The underneath of the vehicles should also be checked for additional casualties in case of pedestrians or cyclists being involved.

'Benefits vs Risks'

This will also give the medic an opportunity to evaluate the kinematics of the impact and determine the likely mechanisms of injury. By quickly gathering information, such as the impact speed, level of intrusion into the passenger cell, what is involved, the type of collision and if the occupants were wearing a seatbelt. All of this will help to determine the severity and types of injuries that might have been sustained during the collision.



Only once the surveys are complete, and controls have been put in place to mitigate or reduce any initial risks to an acceptable level, can other members of the team approach the affected vehicles. Information gained during the inner and outer surveys should be communicated to the rest of the team and, where appropriate, control measures should be implemented at the earliest opportunity. The Incident Commander should then establish an inner cordon as well as identifying a tool staging area and debris dump. The Police are responsible for creating an outer cordon.

Of course, safety does not stop there, and as the incident progresses, other hazards will be introduced by the nature of your activities. For this reason, the Incident Commander should position themselves approximately two-three metres away from the scene of operations, allowing all the critical risk tasks to be managed while keeping an overall view of the incident.

At multi-vehicle incidents, where the scene has been divided, this role may be devolved to sector commanders.

Stability and Initial Access >>>

Regardless of the situation training and pre-planning, they will ensure that tool operators have a systematic approach to stabilising the vehicle whether it is on its roof, side or wheels.

Once safety on the scene is established, the process of stabilising the vehicle can begin. Stability is the foundation of any successful casualty-centred rescue.

Preventing vehicle movement is vital to avoid further injuries to the occupants, offers a solid base for medical intervention and, will avert further

structural deformation of the vehicle during the rescue process. As such, if stability is delayed, safety will be compromised, as will the casualty care and the technical rescue cannot progress.

All of this adds to your on-scene time and delays the extrication. Like any other phase of the incident, you should assess the situation and priorities accordingly, with your safety coming first, closely followed by that of any casualties. If the vehicle is in a precarious position, then securing it should always be the priority.



However, if the vehicle has come to rest in a more favourable position, but the medic is asking for immediate access, then providing this access is paramount. This may be as simple as opening a door or breaking a window. These extreme situations aside, we know that the majority of extractions are performed on vehicles that are on the roadway and still on their wheels, making the rapid introduction of blocks and wedges an adequate control measure.

‘Stabilisation is the foundation of a casualty centred rescue.’

However, a proportion of vehicles will be on their roof or side following a collision making the process more time consuming because of the additional equipment that will be required.

We can look at stability in three phases. Phase one is Manual Stabilisation. If it is identified that a casualty is at immediate risk, then manual stabilisation should be considered. This is where crew members support the vehicle, restricting its movement, while a medic gains access to perform a lifesaving intervention.

For example, when a car is on all four wheels, crew members can brace the vehicle by the wheel arches. This stops the vehicle dropping on its suspension when the medic enters the vehicle and adds additional weight.

However, often the casualty will be responsive. In which case, there is no need for manual stabilisation, and you can skip Phase One and go straight to Phase Two.

Phase Two is Initial Stabilisation and usually involves chocking the wheels and creating four contact points between the vehicle and the ground using Chocks and Blocks. At this point entry to the vehicle can be gained by the medic.

Q: *Why is important to recheck stabilisation?*

A: *During the extrication process the dynamic of the vehicle will change, the vehicle weight, the torsion and loads will all alter, influencing the effectiveness of vehicle stabilisation*

And finally, Phase Three is Full Stabilisation which may merely be adding a fifth point if the vehicle is on its wheels. If the situation dictates and stabilisation is more complicated, you may need to use additional equipment such as stability props or

ratchet straps. Regardless of the situation training and pre-planning, they will ensure that tool operators have a systematic approach to stabilising the vehicle whether it is on its roof, side or wheels.

During the rescue process, stability must continuously be monitored because as weight is removed from the vehicle, or added to by rescue personnel, getting inside the vehicle will cause the dynamics to alter. This means a full check and, where necessary, adjustment of the blocks and any additional equipment that you may have used, must be carried out on a regular basis.

‘Establishing the priorities...’

Once the vehicle is stabilised to a suitable level, the medic can gain access. The access should be rapid and straightforward, allowing casualty care to begin immediately. Once the medic has gained access, where possible, they should switch off the vehicle ignition, if it is still on, and if available, place an airbag restraint over the steering wheel. The vehicle keys or fob in the case of a keyless ignition; should be removed from the vehicle and be passed to the Incident Commander at the earliest opportunity. At this point, the medic will complete a primary assessment and establish the level of entrapment. In other words, they should determine if the casualty is physically trapped by a part of the vehicle or medically trapped because of their clinical needs.

Information from the primary assessment and the level of entrapment is critical to the extrication planning and should be communicated to the Incident Commander as soon as possible. The information provided should include an initial assessment of the casualty’s condition, reference to their stability, and confirm if an immediate extrication is required or whether their injuries are such that a controlled removal is more appropriate.

Space creation >>>

So why is ‘Space Creation’ so important? The obvious answer is that we need to create space to remove the injured casualty from the vehicle and while this is true, there are other factors to consider.



Firstly, the medic will need room to complete a full assessment and provide treatment to their patient.

Secondly, the team of emergency service responders will need enough access to remove the casualty in swift controlled movements, taking in to account their injuries, size and any manual handling concerns.

Finally, determining which space creation options are available will impact the Incident Commanders planning to ensure full access can be provided.

The ‘Space Creation’ phase should start with an inner and outer structural assessment of the vehicle to determine which components can be moved, opened or manipulated - by using the vehicle’s natural design features. It should also establish what obstructions and hazards will impact on space creating techniques. No tools should be necessary at this stage. You are looking for easy wins and gathering information.

‘Space creation begins inside the vehicle!’

These assessments are generally achieved by a one tool operator checking the inside of the

vehicle, while another checks the outside. The external evaluation will typically begin with unlocking and the opening of the doors and the winding down of windows. Each door that opens creates a potential pathway for an immediate extrication and will provide emergency service responders with an access and egress point to the vehicle and, potentially provide the medic with more room to assess their patient. Open doors can also relieve some of the stress placed on the casualty as it reduces the feeling of confinement.

While the outer vehicle assessment is in progress; the second Tool Operator will complete an internal assessment. This will usually start with determining if the seats operate electrically or manually and what movements are available: up, down, forward, backward, recline and so on. Don't forget the back seats, which are often overlooked until well into the rescue. Understanding how and if the rear seats fold or can be removed is often a vital piece of information. Where appropriate and as long as it does not impact on the casualty, seats should be wound back and headrests removed. These small actions will save time later on in the rescue.

Moving on from the seats, any deformation to the vehicle should be assessed to determine the impact on the casualty and any potential space creation options. For example, is the 'B' post infringing on the seat preventing it from reclining? While assessing the inside of the vehicle, the SRSs should be identified: checking the seats, posts, headlining, door panels and the dash. This point is a good opportunity to remove vehicle keys and fit the steering wheel protector if the medic has been unable to do so. And don't forget to check the steering column for adjustment. Those few centimetres could make all the difference. It's also good practice to apply the handbrake if the vehicle is on its wheels, this will help with stability.

Once both surveys have been completed, the tool operators should report their findings to the Incident Commander. By this time the medic should have completed a full assessment of their patient, including determining the most appropriate extrication pathway based on their injuries. Once briefed by the Tool Operators and medic, the Incident Commander is now armed with enough information to formulate a tactical plan.

When formulating the plans, the Incident Commander should take in to account: the time it takes to complete a given space creation technique, whilst considering the clinical needs of the casualty; their position in the vehicle, their size, the level of entrapment, any environmental factors, the size and age of the vehicle and, the outcomes of the vehicle assessment.

If based on the casualties needs, a 'Full Plan' is required that provides 'Full Access', an emergency plan should still be made available - ensuring the pathway of extrication is feasible. This is just in case the casualties condition deteriorates. Don't forget that any entrapment needs to be released first.

Glass Management >>>

Now you know what your extrication plans are and which vehicle body parts need to be removed, displaced or reformed, you can determine which of the vehicle's windows need to be managed.



At one time it was deemed as good practice to remove all of the vehicle's glass. However, we now take a more pragmatic approach and only manage the glass that will be affected as part of the extrication process; having said that if you are removing the vehicle roof, it may be that you need to manage all of the glass in any case.

Since 1980, when it became legislation in the UK for front screens to be made of specified safety glass, generally vehicles have been fitted with a laminated front screen and toughened glass down the sides and at the rear.

However, there are always exceptions, and you may find some vehicles with laminated windows elsewhere, and in recent years, we have also seen the introduction of polycarbonate glazing, although it is still not that common and mainly restricted to high-end vehicles.



This emphasises why it is essential to determine the type of glass fitted to the vehicle when completing the outer vehicle assessment.

When broken or cut, all types of glass present a hazard to rescue workers and casualties alike. Glass in an open wound may even require being scrubbed clean. To prevent this and the danger of cuts and possible contamination, all glass should be appropriately managed, and protection should be provided for the casualty and anyone in the risk area.

This will include wearing respiratory protection, in the form of a dust mask, if deemed a requirement of your Service. Some Services may also use a protective film that can be put over the glass

before cutting or breaking. This protective film sticks to the glass and may reduce the amount of dust produced, while any fragments remain attached to the film mitigating the risk and allowing the broken window to be removed to the debris dump as a complete unit.

There are principally two approaches to managing glass; Controlled Removal or a Controlled Breakage. However, as already mentioned, you may just leave it, if you are satisfied that it will not impact on the rescue process.

On modern vehicles, the front and rear screens are predominately bonded to the vehicle. This means that they will need to be cut if they are laminated, or you will need to complete a controlled break if they are toughened. On older vehicles, the screens may be held in place by a rubber seal. By cutting the seal, the glass can be removed as a complete unit eliminating the risk from glass dust and fragments.

Side windows should be wound down where possible before breaking so the majority of the glass will drop inside the body of the door. In all cases, protective sheets should be used to control glass fragments and dust. Where the glass needs to be pushed from its frame, it should always be pushed outwards using a small protective sheet, not just your firefighting or rescue gloves.

Managing glass is not just about breaking windows!

Glass management does not just involve the removal of the vehicle's windows. It also includes the control of any fragments that present a risk to the casualty, emergency service responders or could damage equipment such as hydraulic hoses. As such the area around the vehicle and the vehicle window frames should be cleared of any glass particles. If the particles cannot be removed,

then you can cover them with a protective sheet. Once the glass is managed, you can then move on to creating full-access.

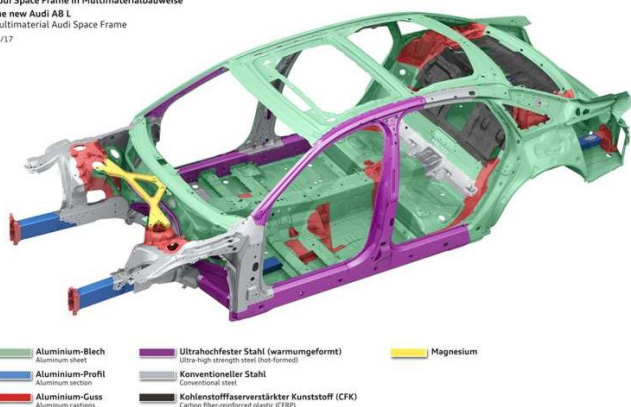


Full Access >>>

Although new vehicle construction may present its challenges, advancement in techniques and equipment means that we are now better prepared to create maximum space than ever before.

So, what is meant by Full Access? Well, it is just ensuring that you have created enough space to be wholly sympathetic to the casualties' clinical requirements and, the needs of emergency service responders. You will have already started to create space by opening doors and manipulating the inside of the vehicle. This phase requires you to go a step further.

Multi-Material Audi Space Frame
The new Audi A8 L
Multimaterial Audi Space Frame
04/17



We are better prepared than ever before to create space, so why not take advantage of it?

In essence, given the situation you face, full access should provide enough space for the casualty to be removed from the vehicle without compromising any of their injuries while allowing emergency service responders the maximum space available. This will let them work safely and efficiently during the final extrication phase.

This may mean removing the roof, the side of the vehicle or, merely opening all the doors. The Incident Commander will have considered all of these factors, and more when formulating their plans.

We have covered how to execute these techniques and others in the 'Space Creation' modules.

Once full access has been created, there needs to be a complete reappraisal of safety on the scene, which will form part of the ongoing Dynamic Risk Assessment. This includes: checking the stability of the vehicle, covering all sharp materials created by the cutting process, the removal of any vehicle debris and, tools that will cause a hazard in the immediate working area.

Extrication and Immobilisation >>>

More often than not you will be relying on your local Ambulance Service to supply the equipment to remove the casualty which will generally be in the form of a rescue board.

There are several well-practised methods for the immobilisation and extrication of your casualty, and the one you choose depends on several factors, which are:

- the casualty's condition
- the casualty's location and orientation

- available resources, equipment and personnel on the scene.

Whichever way you practice immobilisation and extrication, there are some general principles you should consider.

Remember that your space creation process will have created many sharp edges on the vehicle. These must be covered, so the area is safe.

Lifting a casualty, no matter their size provides the potential for rescuer injury. It is essential that proper manual handling procedures are adopted to protect the rescuer, and also the casualty that is being lifted.

Due to their injuries, casualties require swift, yet gentle handling. Rough treatment can exacerbate injuries and worsen their medical condition rapidly. Remember it is not just spinal injuries we have to immobilise and protect, but also internal injuries including, the pelvis for example. All of which can result in significant blood loss and lead to hypovolemic shock.

The movement of your casualty will take more than one person. Therefore, teamwork is vital. Clear communication from the lead medic before any movement is crucial.

Keeping your casualty in line as much as possible is also an important consideration. That's why it is 'good practice' for the extrication route to involve removing the patient in-line.

Finally, we must remember that the immobilisation and extrication phase can come much earlier in the rescue due to the worsening of your casualty's medical condition. In such cases, we must still attempt to provide a level of immobilisation and try to prevent rotation.

Of course, this will be much harder to achieve, and the amount of effort you make to ensure this must be balanced with the immediate needs of your critically ill casualty.

As you are aware, casualty extrication is viewed as two distinct disciplines, namely Technical and Medical. So, it will be at this point where you look to your medical team to step-in and take control.

The removal of your casualty can be a technically and physically challenging task that must be completed safely and rapidly. Ensuring gentle handling of the casualty at all times. It is a skill that should be practised just as much as the technical space creation aspect of the extrication.

Critically, this phase of the rescue must be medically led. The person who is in charge of this phase must know the casualty's condition and **MUST** always guide any movement.

We have already described in the 'Team Approach' element that the Incident Commander is the decision maker. Using the information they have gathered to formulate a plan and maintain the safety of those at the scene.



However, this critical phase of the rescue requires a shift of control. The lead medic must be responsible for leading the casualty's movements.

The Incident Commander will still, however, maintain a focus on safety and will remain in overall charge of the incident. We have now covered the Six Stages of Extrication. By following these guidelines, we ensure the full effectiveness of the 'Team Approach' and provide a casualty-centred extrication.

Final thoughts...

The guidance provided by the UKRO about the Six Stages of Extrication offers a structured and logical approach to follow when rescuing a casualty from a vehicle.

The truth is, this is only part of the story; emergency service responders need to be competent in all areas of the rescue process.

Incident Commanders need to take control, and responders must work together as a team to form a single unit that works cohesively to achieve a common goal. The goal is to rescue casualties and save lives!

Working as a team promotes simultaneous activity, meaning several tasks are completed at the same time, reducing the duration of the extrication.

Only by training can teamwork be developed and opportunities for simulations activities be identified and exploited. Use your training time wisely, don't just look at cutting techniques, analyse how you perform as a team, look at communications, the sequence of events and, the activities that overlap and can save those vital seconds.

