

## Simulating Patient Transport

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Simulation of medical emergencies in a critical care environment has obvious merits but what about simulation of a critically ill patient being transferred in the ambulance to a faraway hospital?

With the advent of new technology allowing for a portable high fidelity manikin and remote wireless control via a notebook computer, this has certainly become a reality at the Bristol Medical Simulation Centre.

The context of doing the simulation in an actual ambulance, in the middle of peak hour city traffic, with the blue light and siren blazing, adds a new dimension to the realism of the scenario. Without exception, the candidates, consisting of a small group of either doctors or nurses, are excited when they are greeted with the sight of a breathing and talking manikin as they step into the back of the ambulance.

The scenario revolves around a critically ill patient, who was previously fit and well. He had suffered from a bout of viral gastroenteritis a few days earlier but has now presented to the local hospital with increasing shortness of breath and hypotension. Unfortunately for him (and the candidates!), he has been diagnosed with severe viral cardiomyopathy with worsening heart failure and needs an urgent transfer to Papworth Hospital for heart transplantation.



Meeting patient for transfer

The patient, at the start of the scenario, is conscious and spontaneously breathing, with an oxygen saturation of 94%, on four litres per minute of oxygen via a Hudson mask. He has borderline hypotension (BP 100/60 mm Hg), supported by a low-dose dobutamine infusion.

Apart from a defibrillator strapped down in a quiet corner of the ambulance, the vehicle is stripped of all resuscitation equipment and drugs. The candidates bring with them their own personally stocked emergency supply bag, which should contain all necessary resuscitation equipment and drugs.

The candidates are briefed by a faculty member in full paramedic uniform. He or she stays with the candidates at the back of the ambulance to drive the manikin via the laptop, show the patient's observations via the laptop screen and observe the candidates' behaviour as the scenario unfolds. An off-duty ambulance driver takes the wheel to ensure all on board are safely (but speedily) driven around Bristol.

As the ambulance gets going, the patient's condition slowly deteriorates. He drops his oxygen saturation to 90% and becomes tachypnoeic with a respiratory rate of 30 per minute. His heart rate changes from a sinus rhythm of 60



Jon and the ambulance

per minute, to 100 with frequent ventricular ectopics. His blood pressure drops to 90/40 mm Hg and he becomes confused with inappropriate verbal responses. As the candidates start to get more concerned about the patient and may begin to go up on the oxygen and the dobutamine, the patient suffers a cardiac arrest.

But is it really ventricular fibrillation on the monitor? With the travelling vehicle possibly causing movement artefacts on the ECG, and the poor lighting and the siren making it difficult to determine if the patient has actually turned apnoeic, candidates often hesitate for a moment at this point. Once they realise the patient now has unrecordable blood pressure and oxygen saturation, they have to draw on their resuscitation skills, but in a totally unfamiliar environment.

This is when a multitude of logistical and human factors come into play in the scenario.

Firstly, there is the practical problem of caring for an arrested patient who is neatly parked in one corner of the moving ambulance, with no access to his head end or the left side of his body. (See picture on the next page).

The candidates need to quickly realise that the ambulance needs to stop as soon as is safely possible, to allow for effective chest compression and safe defibrillation through paddles. The better candidates may ask for the patient to be moved so that a member of the team can control the patient's airway at his head end. Then there is the emergency bag. Unless the candidates have previously checked and familiarised themselves with the bag's contents, they may find it difficult to locate the

airway adjuncts and the emergency drugs they need, under stress and in poor lighting.



Performing CPR in the ambulance

to brief the ambulance crew about the patient's condition. Specific concerns can be raised at the start of the transfer.



Transferring patient

One candidate group recently discovered that adrenaline was missing in their emergency bag – during their resuscitative attempt. Luckily, the patient did live to tell the tales.



Packaging lecture

Human factors play a pivotal role in the success of resuscitation and this is just as true in this scenario. Much precious time can be wasted if the candidates cannot quickly decide on role delegation: the airway, the chest compressions, the defibrillation, the emergency drugs and the team leader/overseer. The importance of an effective team leader is highlighted during the debriefing after the scenario, as those candidates who did not delegate an overseer often reflect on how easily they can get lost in their own task. One group commented that they forgot about administering adrenaline as they were not reminded of the number of defibrillation cycles that had already occurred.

Engaging the ambulance crew early is also an important learning point for the candidates. Acute interventions are much more easily achieved if, at the start of the transfer, all members of the team have introduced each other by name, found out what equipment or drugs are stocked in the ambulance and determined what advanced resuscitation skills the ambulance crew possess. In this scenario the faculty member, apart from driving the simulator, is also available to assist with performing chest compressions if requested. Likewise, it is also important

For example, in a recent debrief, one of the (real) ambulance staff commented that if they were forewarned about the potential for cardiac arrest, they would provide defibrillator gel pads to be put on the patient prior to the transfer, thereby allowing for early defibrillation in a moving vehicle. If a patient suffers a cardiac arrest en route, the crew can also advise on how far away the nearest hospital is located. This has important implications for deciding whether to try and stabilise the patient on the side of the road (and for how long), or rushing to the nearest emergency department. In many ways this two way dialogue with the ambulance crew is akin to the communication between theatre staff promoted by the WHO Surgical Safety Checklist. Every team member has a role to play but their collective capability is much greater if effective communication is facilitated.

The realism and the promotion of situational awareness, forward planning for logistic issues and effective team work, has ensured that this scenario has consistently received very positive feedbacks from candidates. The Bristol Medical Simulation Centre runs this scenario in its Transport of the Critically Ill Course which also encompasses pre-transfer patient assessment, stabilising and packaging a patient prior to transfer, as well as preparing emergency equipment and drugs. This course is run several times a year and is suitable for all medical and paramedical staff involved in critical care.



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