Human Factors and Quality in Resuscitation

CHAPTER 2

Learning outcomes

To understand:

- **The role of human factors in resuscitation**
- **How to use structured communication tools such as SBAR and RSVP**
- **The role of safety incident reporting and audit to improve patient care**

Human factors

The skills of chest compressions, defibrillation, intravenous cannulation and rhythm recognition are considered typically to be the most important factors in managing a cardiac arrest. These are all technical skills that are learnt from books, lectures, courses and peers. Although they are important for the successful resuscitation of a patient, there is another group of skills that is becoming increasingly recognised in medicine - human factors or non-technical skills. Non-technical skills can be defined as the cognitive, social and personal resource skills that complement technical skills and contribute to safe and efficient task performance. More simply, they are the things that affect our personal performance.

Deficiencies in the requisite non-technical skills are a common cause of adverse incidents. The introduction and practice of non-technical skills has been one of the key factors in increasing aviation safety - pilots undergo regular, rigorous assessment of their non-technical skills in order to maintain their licence. Until recently little attention had been paid to the importance of non-technical skills in medicine. The pioneers of this aspect of training in medicine were anaesthetists. Analysis of adverse incidents in anaesthesia showed that in up to 80%, failures in non-technical skills such as communication, checking drug doses, planning and team organisation were responsible, rather than equipment failure or lack of knowledge. As a result the Anaesthetic Crisis Resource Management course was developed in America, followed by the Anaesthetists Non-Technical Skills (ANTS) system, pioneered by a team of anaesthetists and psychologists in Scotland (www.abdn.ac.uk/iprc/ants). The principles used to promote good non-technical skills in the ALS course are based on the principles of ANTS:

- Situational awareness
- Decision making
- Team working, including team leadership
- Task management

Situational awareness

This can be described as an individual's awareness of the environment at the moment of an event and the analysis of this to understand how an individual's actions may impact on future events. This becomes particularly important when many events are happening simultaneously, e.g. at a cardiac arrest. High information input with poor situational awareness may lead to poor decision making and serious consequences. At a cardiac arrest, all those participating will have varying degrees of situational awareness. In a well functioning team, all members will have a common understanding of current events, or shared situational awareness. It is important that only the relevant information is shared otherwise there is too much distraction or noise. At a cardiac arrest, important situational awareness factors include:

- consideration of the location of the arrest, which can give clues to the cause;
- obtaining information from staff about the events leading up to the arrest;
- confirmation of the diagnosis;
- determining who is present - including names, roles, and who is leading;
- noting the actions already initiated e.g. chest compressions;
- checking that a monitor has been attached and interpreting what it shows;
- communicating with the team, gathering information;
- implementing any immediate action necessary;
- consideration of the likely impact of interventions;
- determining the immediate needs.

Decision making

This is defined as the cognitive process of choosing a specific course of action from several alternatives. At a cardiac arrest, the many decisions to be made usually fall to the team leader. The leader will assimilate information from the team members and from personal observation and will use this to determine appropriate interventions. Typical decisions made at a cardiac arrest include:

- diagnosis of the cardiac arrest rhythm;

- choice of shock energy to be used for defibrillation;
- likely reversible causes of the cardiac arrest;
- how long to continue resuscitation.

Once a decision has been made, clear unambiguous communication with the team members is essential to ensure that it is implemented.

Team working, including team leadership

This is one of the most important non-technical skills that contribute to successful management of critical situations. A team is a group of individuals working together with a common goal or purpose. In a team, the members usually have complementary skills and, through coordination of effort, work synergistically. Teams work best when everyone knows each other's name, when they are doing something they perceive to be important, and when their role is within their experience and competence. Optimal team function mandates a team leader. There are several characteristics of a good resuscitation team member:

- Competence – has the skills required at a cardiac arrest and performs them to the best of their ability.
- Commitment – strives to achieve the best outcome for the patient.
- Communicates – openly, indicating their findings and actions taken, and be prepared to raise concerns about clinical or safety issues, but also by listening to briefings and instructions from the team leader.
- Supportive – allows others to achieve their best.
- Accountable – for their own and the team's actions.
- Prepared to admit when help is needed.
- Creative – suggests different ways of interpreting the situation.
- Participates in providing feedback.

Team leadership

A team leader provides guidance, direction and instruction to the team members to enable successful completion of their stated objective. They lead by example and integrity. Team leaders need experience not simply seniority. Team leadership can be considered a process; thereby it can become available to everyone with training and not restricted to those with leadership traits. There are several attributes recognisable in good team leaders:

- Knows everyone in the team by name and knows their capability.
- Accepts the leadership role.
- Is able to delegate tasks appropriately.
- Is knowledgeable and has sufficient credibility to influence the team through role modelling and professionalism.
- Stays calm and keeps everyone else focused and controls distractions.
- Is a good communicator – not just good at giving instructions, but also a good listener and decisive in action. Is empathic towards the whole team.
- Is assertive and authoritative when appropriate.
- Shows tolerance towards hesitancy or nervousness in the emergency setting.
- Has good situational awareness; has the ability to constantly monitor the situation, with an up to date overview, listening and deciding on a course of action.

During a cardiac arrest, the role of team leader is not always immediately obvious. The leader should state early on that they are assuming the role of team leader. Specifically, at a cardiac arrest the leader should:

- Follow current resuscitation guidelines or explain a reason for any significant deviation from standard protocols.
- If they are unsure, he or she should consult with the team or call for senior advice and assistance if appropriate.
- Play to the strengths of team members and allow them some autonomy if their skills are adequate.
- Allocate roles and tasks throughout the resuscitation and be specific. This avoids several people or nobody attempting the task!
- Use the two-minute periods of chest compressions to plan tasks and safety aspects of the resuscitation attempt with the team.
- At the end of the resuscitation attempt, thank the team and ensure that staff and relatives are being supported. Complete all documentation and ensure an adequate handover.

Task management

During the resuscitation of a patient, either in a peri-arrest or full cardiac arrest situation, there are numerous tasks to be carried out by the team members, either sequentially or simultaneously. The coordination and control, or management, of these tasks is the

responsibility of the team leader (Figure 2.1). They include:

- Planning, where appropriate and briefing the team, prior to the arrival of the patient.
- Being inclusive of team members.
- Being prepared for both the expected and the unexpected.
- Identification of resources required - ensure that equipment is checked and specifics organised and delegated.
- Prioritising actions of the team.
- Watching out for fatigue, stress and distress amongst the team.
- Managing conflict.
- Communicating with relatives.
- Communicating with experts for safe handover both by telephone and in person.
- Debriefing the team.
- Reporting untoward incidents, particularly equipment or system failures (see below).
- Participation in audit.

Figure 2.1 Task management

The importance of communication when managing a sick patient

Communication problems are a factor in up to 80% of adverse incidents or near miss reports in hospitals. This failure of communication is also evident when a medical emergency occurs on a ward and a doctor or nurse summons senior help. The call for help is often suboptimal, with failure by the caller to communicate the seriousness of the situation and to convey information in a way that informs the recipient of the urgency of the situation. The poor-quality information heightens the anxiety of the person responding to the call, who is then uncertain of the nature of the problem they are about to face. A well-structured process that is simple, reliable and dependable, will enable the caller to convey the important facts and urgency, and will help the recipient to plan ahead. It was for similar reasons that the ABCDE approach was developed as an aide memoire of the key technical skills required to manage a cardiac arrest.

The use of the SBAR (Situation, Background, Assessment, Recommendation) or RSVP (Reason, Story, Vital signs, Plan) tool enables effective, timely communication between individuals from different clinical backgrounds and hierarchies (Table 2.1).

Resuscitation teams

The resuscitation team may take the form of a traditional cardiac arrest team, which is called only when cardiac arrest is recognised. Alternatively, hospitals may have strategies to recognise patients at risk of cardiac arrest and to summon a team (e.g. medical emergency team) before cardiac arrest occurs (Chapter 3). The term resuscitation team reflects the range of response teams. As the team may change daily or more frequently, as shift pattern working is introduced, members may not know each other or the skill mix of the team members. The team should therefore meet at the beginning of their period on duty to:

- Introduce themselves; communication is much easier and more effective if people can be referred to by their name.
- Identify everyone's skills and experience.
- Allocate the team leader. Skill and experience takes precedence over seniority.
- Allocate responsibilities; if key skills are lacking, e.g. nobody skilled in tracheal intubation, work out how this deficit can be managed.
- Review any patients who have been identified as 'at risk' during the previous duty period.

Finally, every effort should be made to enable the team members to meet to debrief (Figure 2.2), e.g. difficulties or concerns about their performance, problems or concerns with equipment and submit incident reports. It may also be possible to carry out a formal handover to the incoming team.

Figure 2.2 Team debrief

SBAR	RSVP	Content	Example
SITUATION	**R**EASON	• Introduce yourself and check you are speaking to the correct person • Identify the patient you are calling about (who and where) • Say what you think the current problem is, or appears to be • State what you need advice about • Useful phrases: - The problem appears to be cardiac/ respiratory/neurological/sepsis - I'm not sure what the problem is but the patient is deteriorating - The patient is unstable, getting worse and I need help	• Hi, I'm Dr Smith the medical F2 • I am calling about Mr Brown on acute medical admissions who I think has a severe pneumonia and is septic • He has an oxygen saturation of 90% despite high-flow oxygen and I am very worried about him
BACKGROUND	**S**TORY	• Background information about the patient • Reason for admission • Relevant past medical history	• He is 55 and previously fit and well • He has had fever and a cough for 2 days • He arrived 15 minutes ago by ambulance
ASSESSMENT	**V**ITAL SIGNS	• Include specific observations and vital sign values based on ABCDE approach • Airway • Breathing • Circulation • Disability • Exposure • The early warning score is…	• He looks very unwell and is tiring • Airway - he can say a few words • Breathing - his respiratory rate is 24, he has bronchial breathing on the left side. His oxygen saturation is 90% on high - flow oxygen. I am getting a blood gas and chest X-ray • Circulation - his pulse is 110, his blood pressure is 110/60 • Disability - he is drowsy but can talk a few words • Exposure - he has no rashes
RECOMMENDATION	**P**LAN	• State explicitly what you want the person you are calling to do • What by when? • Useful phrases: - I am going to start the following treatment; is there anything else you can suggest? - I am going to do the following investigations; is there anything else you can suggest? - If they do not improve; when would you like to be called? - I don't think I can do any more; I would like you to see the patient urgently	• I am getting antibiotics ready and he is on IV fluids • I need help - please can you come and see him straight away

Table 2.1 SBAR and RSVP communication tools

High quality care

The Institute of Medicine defines that quality care is safe, effective, patient-centred, timely, efficient and equitable. Hospitals, resuscitation teams and ALS providers should ensure they deliver these aspects of quality to improve the care of the deteriorating patient and patients in cardiac arrest. Two aspects of this are safety incident reporting (also called adverse or critical incident reporting) and collecting good quality data.

Safety incident reporting

In England and Wales, hospitals can report patient safety incidents to the National Patient Safety Agency (NPSA) National Reporting and Learning System (NRLS) (http://www.nrls.npsa.nhs.uk/report-a-patient-safety-incident/). A patient safety incident is defined as 'any unintended or unexpected incident that could have harmed or did lead to harm for one or more patients being cared for by the National Health Service (NHS)'. Previous reviews of this database have identified patient safety incidents associated with airway devices in critical care units and led to recommendations to improve safety. A review of NPSA safety incidents relating to cardiac arrest and patient deterioration by the Resuscitation Council (UK) shows that the commonest reported incidents are associated with equipment problems, communication, delays in the resuscitation team attending, and failure to escalate treatment.

Audit and outcome after cardiac arrest

Measurement of processes and outcomes provides information about whether interventions and changes made to resuscitation guidelines improve patient care. Published survival rates from in-hospital cardiac arrest vary substantially and range from 13 - 59% at 24 h and 3 - 27% to discharge, with a median survival to discharge of about 15%. There are probably two main reasons for such variation: firstly, there are many confounders that influence outcome following cardiac arrest. These include:

- differences in the type of EMS system (e.g. availability of defibrillators, differences in response intervals);
- differences in the incidence of bystander CPR;
- different patient populations (e.g. a study may be confined to in-hospital cardiac arrests or may include pre-hospital arrests);
- the prevalence of co-morbid conditions;
- the frequency of implementing do-not-attempt-resuscitation (DNAR) policies;
- the primary arrest rhythm;
- the definition of cardiac arrest (e.g. inclusion of primary respiratory arrests);
- availability of cardiac arrest and medical emergency teams.

Secondly, there is lack of uniformity in reporting both the process and results of resuscitation attempts; for example, the definition of survival is reported variously as return of spontaneous circulation, or survival at 5 min, 1 h, 24 h, or to discharge from hospital. The lack of uniformity in cardiac arrest reporting makes it difficult to evaluate the impact on survival of individual factors, such as new drugs or techniques.

New interventions that improve survival rate only slightly are important because of the many victims of cardiac arrest each year. Local hospitals or healthcare systems are unlikely to have sufficient patients to identify these effects or eliminate confounders. One way around this dilemma is by adopting uniform definitions and collecting standardised data on both the process and outcome of resuscitation on many patients in multiple centres. Changes in the resuscitation process can then be introduced and evaluated using a reliable measure of outcome. This methodology enables drugs and techniques developed in experimental studies to be evaluated reliably in the clinical setting.

In the UK, the National Cardiac Arrest Audit (NCAA) is an ongoing, national, comparative outcome audit of in-hospital cardiac arrests. It is a joint initiative between the Resuscitation Council (UK) and the Intensive Care National Audit & Research Centre (ICNARC) and is open to all acute hospitals in the UK and Ireland. The audit monitors and reports on the incidence of, and outcome from, in-hospital cardiac arrest in order to inform practice and policy. It aims to identify and foster improvements in the prevention, care delivery and outcomes from cardiac arrest. The initial scope of data collection is patients who meet all of the following criteria:

- Adults or children over 28 days of age
- Receive chest compressions and/or defibrillation
- Attended by the hospital-based resuscitation team (or equivalent) in response to a 2222 call.

Data are collected according to standardised definitions and entered onto the NCAA secure web-based system. Once data are validated, hospitals are provided with activity reports and comparative reports, allowing a comparison of to be made not only within, but also between, hospitals locally, nationally and internationally. Furthermore it also enables the effects of introducing changes to guidelines, new drugs, new techniques etc to be monitored that would not be possible on a hospital-by-hospital basis.

Key learning points

- Human factors are important during resuscitation.
- Use SBAR or RSVP for effective communication.
- Report safety incidents and collect cardiac arrest data to help improve patient care.

Further reading

Featherstone P, Chalmers T, Smith GB. RSVP: a system for communication of deterioration in hospital patients. Br J Nurs 2008;17:860-64.

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Acknowledgment

The Resuscitation Council (UK) would like to express its thanks to Professor Rhona Flin, University of Aberdeen, for permission to use the Anaesthetists Non-Technical Skills (ANTS) system.