sandpiper

saving lives in rural Australia

GUIDING PRINCIPLES
&
STANDARD OPERATING PROCEDURES

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SANDPIPER AUSTRALIA
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In partnership with The Sandpiper Trust (Scotland)
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RURAL DOCTORS ASSOCIATION OF AUSTRALIA

Australian College of Rural & Remote Medicine

RDAQ FOUNDATION

The UK Sandpiper Trust was founded in 2001 following the death of 14-year-old Sandy Dickson in a tragic accident. They provide emergency life-saving medical equipment within the Sandpiper Bag to rural clinicians to enable pre-hospital emergency care to be provided in situations where ambulance response time is long, or where the skills of a doctor are required alongside those of ambulance paramedics.

Since 2001, Sandpiper has sent out more than 1,250 bags and saved countless lives across rural Scotland. Training is provided through BASICS-Scotland - part of the UK-wide British Association for Immediate Care Schemes, which provides a framework to task trained clinicians to the scene of an incident to support ambulance personnel in a structured manner.

Sandpiper Australia was formed in 2019 by a group of rural clinicians, concerned that most of Australia lacks a network to harness the clinical skills of rural clinicians. These clinicians usually have ongoing experience in emergency medicine via their work for rural hospitals and are enmeshed in their communities. Despite the tyranny of distance, there has been a focus on metro-based retrieval services or reliance on ambulance personnel who may be scarce on the ground or have limited treatment options, particularly if volunteer-based. This gives rise to the 'trauma gap' in rural Australia - a delay in care due to either lack of local expertise or delay in arrival of specialist care

We hope to emulate the success of The Sandpiper Trust by advocacy to raise funds to equip rural clinicians with a standardised Sandpiper Bag. This document outlines some of the additional skills pertaining to personal and scene safety, consideration of scene momentum and outline a limited suite of meaningful interventions that the trained Sandpiper clinician should be capable and competent to deliver under pressure.

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1. Introduction

Sandpiper Australia is a charity established in 2019 to champion the development of a National Rural Emergency Responder Network (RERN), utilising the rural clinician workforce to 'value add' in the event of a prehospital emergency in rural communities.

The charity has the support of the Sandpiper Trust in Scotland, which has supplied over 1250 'Sandpiper Bags' across rural Scotland since inception, supported by training under the auspices of BASICS-Scotland and the prehospital emergency care (PHEC) course.

This document outlines general guidelines and standard operating procedures for Sandpiper responders. Necessarily these are guidelines and we recognise that some topics (such as tasking and integration into local systems) are still in embryonic form. However broad principles of care apply as outlined.

For clinical procedures and drug dosing, we recognise that rural clinicians are AHPRA-registered professionals and that emergency medicine intersects with the work of rural generalists. Appropriate medical indemnity and performing to clinical competency is required, both for the safety of patients, of the individual clinician and also for the reputation of Sandpiper responders.

"Expertise in a hospital may not translate to the challenging prehospital environment"

Moreover there exists a problem of maintaining competency in the face of small clinical case loads and limited opportunity to maintain prehospital skills or clinical judgment in the challenging prehospital environment.

We believe that Sandpiper members should be assessed and signed off on a series of core competencies via task-training and immersive simulation at a recognised training course, as a requirement to take possession of a Sandpiper bag.

We would also encourage Sandpiper members to undertake regular updates, both though refresher courses, co-training with local ambulance responders and engagement with State-based retrieval services. Immersive simulation scenarios and regular case audit can be a powerful tool to best understand and develop the Sandpiper role in a local context.

The role of the Sandpiper clinician - or indeed any rural clinician - is not only to deliver best care, anywhere.....but also to advocate for change. We hope that such advocacy will help build Sandpiper as a 'known value' resource and in time be incorporated into rural and regional emergency responses as a norm not an exception.

This document outlines some of the core areas and competencies that will are assessed and required to be signed off as a Sandpiper responder.

1.1 Tasking and responding

At the present time, only South Australia has an integrated Rural Emergency Response Network (RERN) into their Emergency Operations Centre tasking. RERN doctors carry a pager and mobile phone, and are tasked by SA Ambulance Service to prehospital incidents where they can either 'value add' or where suitably experienced and equipped personnel are not available.

There is no similar scheme in the rest of Australia, despite the tyranny of distance. Unfortunately with increasing rurality, the increasing chance that ambulance resources will be limited and that specialist retrieval teams will take time to arrive. This gives rise to a 'trauma gap' in the case of local incident.

It is hoped that the Sandpiper Australia collaboration with partners such as the Rural Doctors Association of Australia, the Australian College of Rural & Remote Medicine and the Royal Australian College of GPs will enable doctors in each State to advocate for a Sandpiper bag in their community and undergo Sandpiper training. Building up local relationships with emergency services (local ambulance, road crash rescue , parks, coastguard, police etc) may be a powerful 'enabler' from the ground up to encourage utilisation of the local Sandpiper clinician.

At a State and Federal level, we hope that major players such as the RDAA, ACRRM, RACGP and Rural Health Commissioner will advocate for inclusion of Sandpiper members in emergency responses, as appropriate. Inevitably such responses will be contextualised to local needs, geography, available resources and politics!

With the exception of the SA RERN scheme, rural doctors are generally excluded from involvement in Statewide trauma responses. The role of primary care in responding to local incidents has been highlighted in the Royal Commission report on the 2019-20 bushfires, with a call for primary care to be involved in disaster preparation, planning and response in the future (Royal Commission into Natural Disasters, 2020).

An oft-quoted phrase is that the prehospital environment is 'no place for enthusiastic amateurs'. This is certainly true - prehospital care is a discipline in it's own right and specific training is required. A 2012 survey identified that 58% of rural GP-anaesthetist survey responders had attended a prehospital incident in their community in the previous 12 months. Importantly they had been tasked by State-based ambulance or retrieval service, for instances where senior clinician help was needed but not immediately to hand. This is paradoxical to the notion of 'no place for enthusiastic amateurs' and reflects the occasional need for a clinician on scene. There is of course a considerable hazard in sending untrained, unequipped clinicians, regardless of experience, to a prehospital scene. A system of training and governance is needed. Sandpiper, in partnership with the RDAA, ACRRM and other agencies, hopes to provide contextualised training for rural doctors to match exisiting rural curriculum and reality.

Tasking

In most States rural generalist clinicians are not integrated into Statewide tasking. Novel technology, such as the GoodSAM app may allow Emergency Operations Centres to see the location and availability of registered Sandpipers to a prehospital scene and enable tasking.

It is hoped that by establishing and demonstrating availability of a network of rural clinicians, equipped appropriately and trained to perform a suite of meaningful interventions, we can help reduce the toll of rural trauma.

Confirming availability & readiness

Rural clinicians often have responsibility for clinic, in-patient and on call patient loads. They may also get little down time. The notion of a National Rural Emergency Responder Scheme is very much on a

voluntary-basis. Rural clinicians are intimately involved in their community and provision of prehospital care is consistent with 'cradle-to-grave' care (or perhaps 'roadside-to-rehabilitation').

If asked to attend, a rural clinician should consider carefully his or her commitments. It may be impossible to attend if delivering an anaesthetic or managing another critically unwell hospital patient, unless a colleague is capable and competent to act in place. Similarly it would be unwise to attend if impaired through fatigue, illness or medication.

The mnemonic "I'M SAFE" is commonly used in the aviation industry and is a useful reminder of factors that may impact on readiness

I	Illness
M	Medication
S	Stress
A	Alcohol
F	Fatigue
E	Emotion

Arriving safely

There is a danger of 'red mist' when driving to an accident. Sandpiper clinicians are not authorised to break the road rules - they carry neither lights nor sirens and must drive according to both road rules and the prevailing conditions. A few seconds delay in arrival is unlikely to significantly affect the outcome.

A choice has to be made whether to respond in own vehicle or to be met en route and transported by an emergency services vehicle (eg ambulance, police etc). This decision will need to be made as a balance of your location, the accident scene and availability of other assets.

For responding to a remote site, try and travel with the ambulance wherever possible - this allows you to prepare equipment, to assign roles with the ambulance responders and also to maintain radio communication - which may add vital additional information prior to arrival on scene.

Remember - drive to arrive

Once on scene, park safely in a 'fend off' position with hazard lights on display. There is a very real risk of becoming a victim from passing vehicles in a traffic incident, so at first ensure your safety before attempting to rescue others. Ensure you are wearing bright reflective clothing.

Standard PPE should include boots, hard-wearing trousers with knee-protection, shirt, reflective jacket or vest, hard hat, gloves and sun/insect protection.
Arrival on scene

Expertise in managing an emergency in the hospital does not necessarily translate to expertise in the prehospital setting. A negative perception of inexperienced, 'strong but wrong' or 'rogue' clinicians on scene risks causing reputational damage to Sandpiper and decreasing the likelihood of future involvement in such cases.

Insurance and Documentation

It needs to be considered whether your role in responding is as a "good samaritan" or as a paid responder. This will vary according to local arrangements & case circumstances. It would be prudent to ensure that medical indemnity covers involvement in prehospital care, as well as to consider risk/benefit of responding vs not responding, issues such as potential injury driving to and arriving on scene etc. Whilst it is expected that all Sandpiper clinicians will act professionally and to their scope of practice, ensue that your indemnity covers emergency procedures!

At the end of a case, is is a requirement that you keep a case record - either using existing clinical case records or a dedicated Sandpiper record. See Appendix One for an example.

Responding to a request to attend the prehospital scene

If a Sandpiper clinician is asked to attend, please follow these general principles:

- *confirm your ability to respond or not with the tasking agency*
- *if able to respond, confirm the precise location of the scene,*
- *confirm whether you will travel in own vehicle or rendezvous with an emergency services vehicle (eg ambulance, fire, police)*
- *confirm how you will be contactable if the case is canceled or further information is available (eg mobile phone, via ambulance radio etc)*
- *if travelling in own vehicle, adhere to speed limits. Sandpiper responders are NOT operating under the jurisprudence of an ambulance service & carry neither lights nor sirens. For the safety of yourself, other road users and the reputation of Sandpiper, it is expected that responders adhere to the road rules & drive with due caution. Remember the key phrase "drive to arrive".*
- *once on scene, park safely (fend off position, or as directed by emergency services) and introduce yourself to the scene commander*
- *ensure that you have appropriate personal protective equipment for your safety,*
- *do not seek to duplicate or take over the skill set of local emergency responders. Your role as a Sandpiper responder is to 'value add' when appropriate.*
- *provide a SITREP through appropriate channels as soon as possible (liaise with on scene emergency responders)*

1.2 Interaction with other agencies

Building up effective teams is vital to making things happen' in critical care. Given the central role of the rural clinician in his or her community, we strongly recommend that Sandpiper responders make themselves known at the earliest opportunity to local emergency services.

There is always opportunity for rural clinicians to cross-train with local ambulance, road crash rescue, search and recovery, police, parks, coastguard etc. Donating a little of your time and explaining your role as a Sandpiper responder will pay dividends in establishing trust. This translates into higher likelihood of the Sandpiper responder being requested on occasions, as well as facilitating effective teamwork 'on scene' when performing in difficult circumstances.

When liaising with other agencies, recognise that they may not know you nor your role. Furthermore, individuals and agencies may have competing priorities. As a Sandpiper clinician you may be focussed on patient assessment and critical procedures. However on scene Police may be concerned with safety, traffic hazards, road closure and crime scene. The Country Fire Service or State Emergency Service may be focussed on vehicle extrication, safety and hazards such as fire, electricity, airbag deployment or fuel leak. Ambulance officers & paramedics may be focussed on patient assessment and extrication, and be uncertain of your role and how Sandpiper interfaces with their own standard operating protocols, with little room for clinical flexibility.

Key strategies to creating effective teamwork and 'making things happen' on scene include the use of names, ensuring closed loop communication and frequent sharing of the mental model.

Simulation training ('train as you fight') with other agencies can help to significantly improve team effectiveness. This is mostly by understanding the value of human factors on performance in a crisis.

Debrief can often uncover fascinating insights into how individuals and teams perform, as well as explore aspects of self, team, environment, patient & system in determining resuscitation success.

Simulation exercises can help clinicians translate commonly performed emergency procedures to the challenge of a chaotic and austere prehospital environment.

1.3 Training and competency

Many rural clinicians will have accrued significant experience in the initial management of the critically unwell patient. However it is recognised that such patients are not 'everyday' and - as with many other aspects of rural generalist practice - our expertise relates to 'occasionalism'.

Critical illness does not respect geography. The needs of injured patients require us to be 'expert enough' to ensure their safety and to ensure therapeutic momentum. Many rural clinicians will have admitting rights to their local hospital and may participate in an on-call roster for emergency, anaesthesia, obstetrics or surgery. Hospital credentialing bodies will often outline scope of clinical practice, based on prior experience and ongoing continuing professional development. Entry level courses are available to rural doctors, including :

APLS	Advanced Paediatric Life Support	APLS Australia
EMST	Early Management of Severe Trauma	Royal Australian College of Surgeons
REST	Rural Emergency Skills Training	Australian College Rural Remote Medicine
RESP	Rural Emergency Skills Program	LearnEM.org
ELS	Emergency Life Support	Australian College of Emergency Medicine
ETM	Emergency Trauma Management	ETMcourse.com

Other options include in-house programs (via State health departments) or emergency workshops (via Colleges or State-based Rural Doctor Association memberships). However most of this educational content is geared towards hospital-based emergency skills. Whist the technical aspects remains the same, there is a need to understand the impact of the prehospital context on patient assessment and procedures. Courses geared towards prehospital care are useful, such as :

PHTLS	Prehospital Trauma Life Support	National Association of EM Technicians
STAR	Safe Transfer and Retrieval	Royal Flying Doctor Service Queensland
PHEC	Prehospital Emergency Care	Australian College Rural Remote Medicine

Alternatively some prehospital services offer slots for rural clinicians at their 6 monthly registrar induction programs, or may offer bespoke courses for rural responders (as in RERN South Australia). Internationally the Anaesthesia, Trauma & Critical Care (ATACC) course is becoming recognised as the premier course in multidisciplinary trauma management - but be aware this is held in the UK only and has a two year waiting list! More details at atacc.co.uk (NB the ATACC manual is available for free download and is an excellent resource for prehospital care).

A dedicated Australia-wide course is a suitable entry level to the Sandpiper scheme (eg ACRRM PHEC course or equivalent), with successful completion a requirement for possession of a Sandpiper bag.

Key features of training should include :

- introduction to the role of the rural clinician in local prehospital incidents
- aims and ethos of the Sandpiper clinician
- scene safety and interaction with other agencies
- introduction to the Sandpiper Bag and equipment
- task training in key competencies to 'value add' on scene
- immersive simulation training in the prehospital environment
- recognition of training under appropriate curriculum content via ACRRM / RACGP

A natural concern is where the Sandpiper model will sit in terms of training and governance, especially in regard to other organisations and responder groupings. Different arrangements may evolve in different locations, but in general we hope that the skillset of rural clinicians will be incorporated into systems, with an emphasis on clinician responsibility to act within their scope of practice.

The Faculty of Prehospital Care of the UK Royal College of Surgeons (Edinburgh) has established a robust PHEM Skills Framework with the purpose of developing a series of levels to allow a greater understanding of the clinical skills/competencies of various pre-hospital care providers arriving at an incident. The UK Faculty of Prehospital Care PHEM skills framework outlines various levels of responder:

A	*First Aider (management of an unconscious, bleeding or arrested patient). Certificated by a non national organisation.*
B	*First Level responder, nationally certified and qualified to meet statutory requirements within the work place eg EFAW, FAW.*
	Levels C to H will be operating within a framework of governance and CPD
C	*Nationally certificated pre-hospital responder (use of airway adjuncts & oxygen) eg Community First Responder*
E	*Nationally certificated non health care professional pre-hospital provider caring for patients as a primary role eg USAR, some military personnel and specialist certificated police officers and firefighters*
F	*Non-registered health care professional eg Ambulance Technician, CMT1.*
G	*Registered pre hospital care practitioner*
H	*Advanced registered pre hospital care practitioner*

See https://fphc.rcsed.ac.uk/my-fphc/resources/academic-and-professional-resources/fphc-phem-skills-framework

It is anticipated that the Sandpiper clinician should operate at levels G or H, depending on skills and accredited competency.

We anticipate that different models of clinical governance will evolve in Australia, as Sandpiper Clinicians become integrated into State-based emergency responses, whether through ambulance, State-health or other agencies.

Critical illness does not respect geography

Help improve trauma care by advocating for inclusion of Rural Generalists and other clinicians in supporting prehospital care in rural Australia

A National Rural Responder Network is needed

to narrow the 'trauma gap' in Australia

1.4 Remuneration

Jurisdictional arrangements for rural responders will vary across Australia as the program grows.

At a fundamental and ethical level, the rural clinician may be expected to respond to many forms of emergencies when requested, unless unavailable or incapacitated. Clearly anticipated primary care emergency call outs should fall within contractual arrangements with local hospital or 'after hours' responsibilities. Issues such as fatigue management and participation in an on call roster may mitigate against burnout.

The involvement in prehospital incidents in the community is very much expected to be the exception, not the rule. The model is not to replace ambulance providers or to force rural clinicians into becoming de facto first responders in areas where ambulance recruitment has failed. But how should this be compensated? Is the rural clinician a missionary or a mercenary? There is no clear answer for the issue of remuneration in regard to rural responders.

It is not expected that Sandpiper clinicians work for free, although some clinicians may be prepared to do so on the basis that such work is occasional, offers variety and also has clear benefits for the rural communities in which we are embedded.

Looking to the UK, many rural doctors participate in BASICS schemes on an unpaid voluntary basis, in recognition that their involvement is occasional, adds variety to the job description and has clear benefits for members of the rural community in which they live. Such responders are akin to the global social enterprise 'GoodSAM' scheme, which mobilises off-duty doctors, nurses and paramedics to respond to nearby out-of-hospital cardiac arrests via smartphone technology.

In contrast New Zealand also has a formal scheme to involve primary care to respond to prehospital incidents, but this is remunerated via a lump sum based on number of call outs plus an hourly rate, including travel.

The South Australian RERN scheme is currently the only recognised system in Australia which integrates primary care into State-based prehospital services. Clinicians are remunerated utilising the existing fee-for-service relationships between rural doctors and the rural local health networks, recognising that such call outs are an extension of the emergency on call service for the local rural hospital. Attendance at call outs is however voluntary. It would be premature to anticipate that other States follow suit, and other models of engagement may emerge over time.

It would certainly be possible for Sandpiper clinicians to raise an appropriate fee with the patient, although it may be more palatable to tie this remuneration to exisiting insurance schemes such as Medicare (using emergency item numbers 160-164) or State-based motor vehicle accident insurance schemes.

Clearly there is no 'one size fits all' model and it remains to be seen where Sandpiper will fit in the overall scheme of things. But the fact remains that involvement in community-based emergency care is a key feature of rural clinicians and Australia needs a system. Advocacy by rural communities and political pressure may be required.

1.5 Audit

Traditionally medical staff have been exposed to audit in the form of 'morbidity and mortality' meetings. By its very definition, this is usually post hoc audit of cases where there has been adverse outcome or an 'interesting case'. There is a danger to such audit; typically it tends to represent the two extremes - either we get feedback when things went really well....or when they did not!

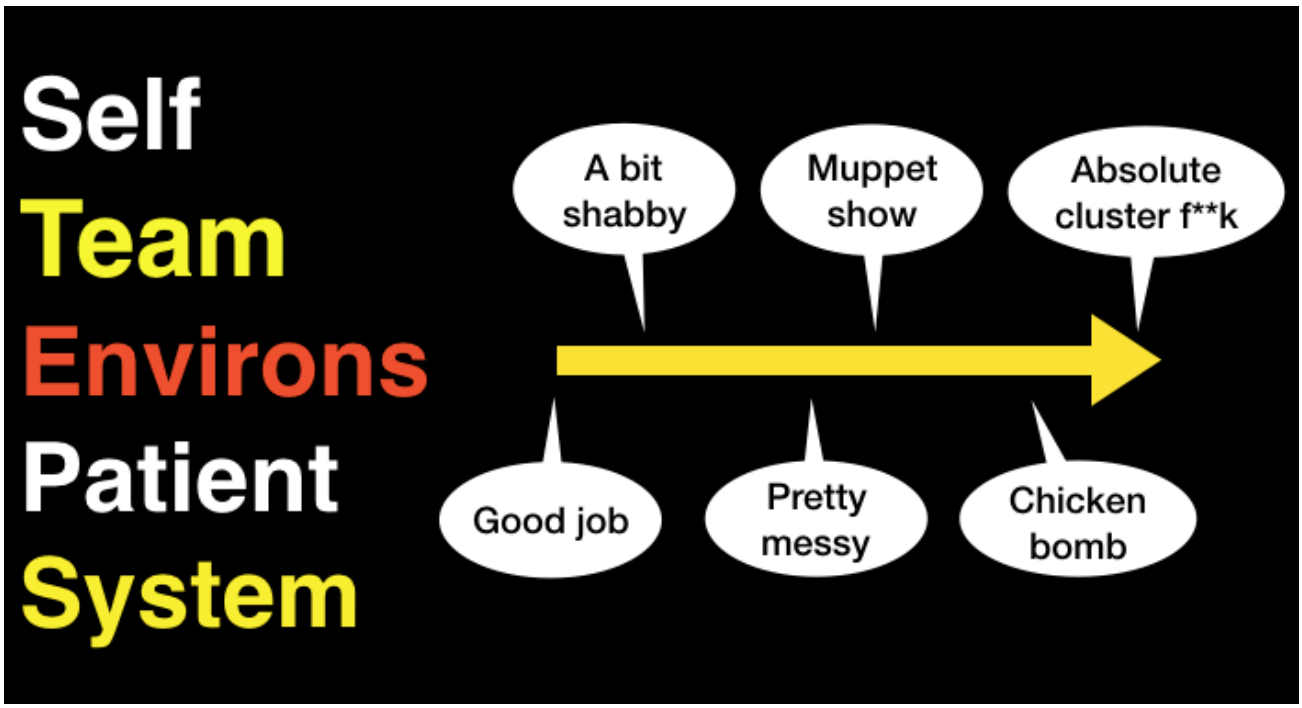
If we accept the notion that audit is a tool to help drive quality improvement, then there may be more value in auditing the everyday, routine or mundane and seeking to see what can be improved - rather than concentrate on the extremes of the bell curve. A key feature of a mature clinical service is routine case audit as a quality improvement measure. Most prehospital services will audit all cases in a weekly or monthly review. Some may even use a standardised audit tool after each mission to flag up issues.

The RERN system in South Australia operates under a governance body with representatives from ambulance, country health, retrieval and the RERN clinicians themselves. Regular education meetings include an audit of RERN cases and this helps drive quality. Until Sandpiper responders are similar integrated into State-based systems, it will be hard to engage in and drive multidisciplinary audit of cases.

In the meanwhile we would encourage all Sandpiper responders to audit their own involvement in prehospital cases. An example of an audit tool is in Appendix Two.

As clinicians we will tend to focus on clinical aspects of the case when reviewing our performance. However a key message from experienced resuscitationists, both in the prehospital and hospital environments, has been an understanding of the impact of other factors that can affect success.

Consider the following illustration, noting that the tendency of performance to degrade as we lose control of any one or more of the key factors of Self-Team-Environment-Patient-System.



Adapted from Cliff Reid 'Making Things Happen, smaccSYDNEY 2013

**"Under pressure, we do not rise to the level of our expectations,
Instead we fall to the level of our training"**

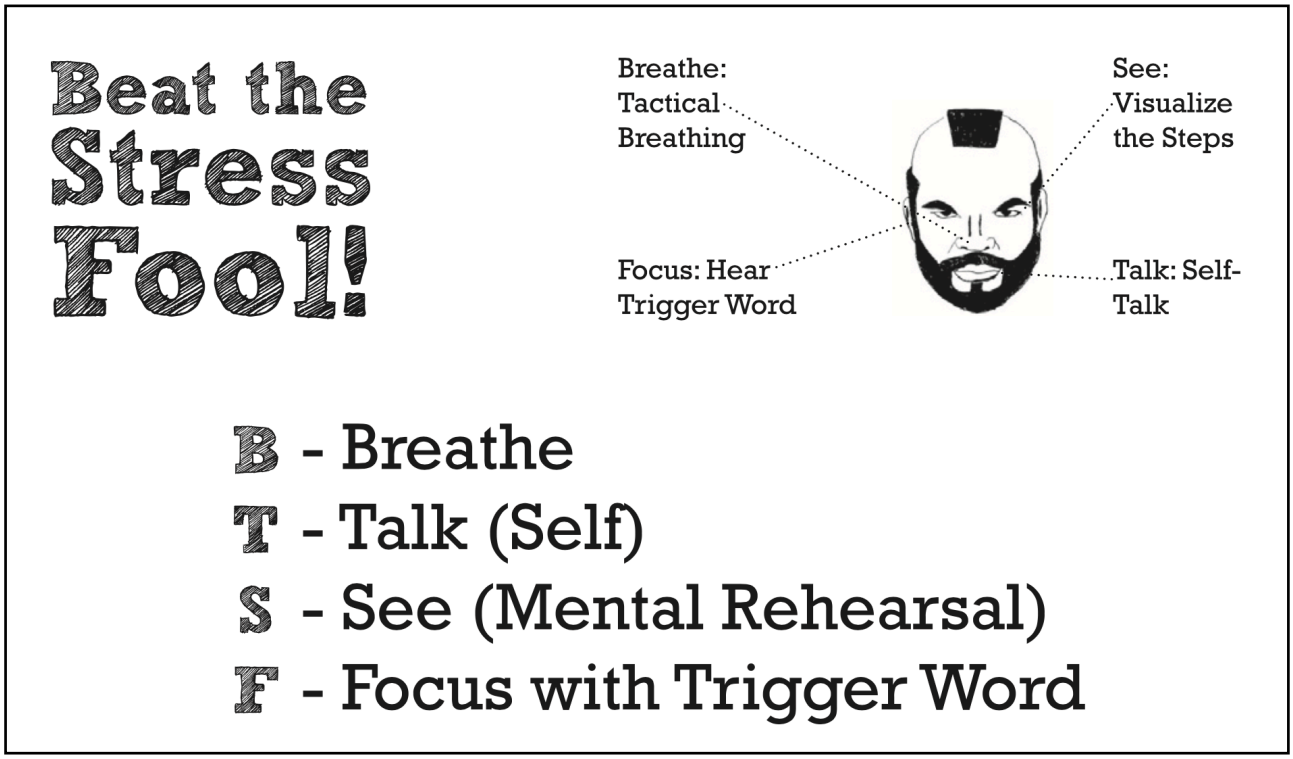
The above quote is from the Greek warrior poet Archilochus (680 – 645 BC), who recognised the impact of stress on performance, particularly as pertaining to military prowess. It is certainly true that performance may suffer when we are under stress - whether this is due to cognitive load, situational urgency or stressful conditions. All of which are highly relevant to work in the prehospital arena. There is an emerging literature in regard to performance of clinicians under pressure, which is highly recommended reading (Lauria et al, 2017).

Awareness of SELF - TEAM - ENVIRONMENT - PATIENT - SYSTEM (STEPS) is a cornerstone of resuscitation management, both in hospital and in the prehospital environment.

Self considerations

These include previously described 'I'M SAFE' factors that impact on performance. It is common for clinicians - regardless of experience - to feel a degree of stress in a crisis.

There are well-described techniques to mitigate this 'sympathetic surge', including the easily-recalled phrase 'beat the stress fool'. This phrase is a reminder to breathe - talk - see - focus



From Lauria et al 2017.

The juxtaposition of 'Mr T' (a 1980's action hero from the TV series 'The A-Team') speaking out loud 'Beat The Stress Fool' may raise a smile and decrease tension - then enable the clinician to enact the mantra of breathe, talk, see, focus

Breathe — Stress produces a sympathetic surge; tactical or box breathing will slow this autonomic response. Breathe in slowly and deeply through nose over 4 secs, attempting to draw down the diaphragm , hold 4 secs, exhale through mouth, hold 4 secs and repeat

As you approach the scene you see multiple casualties and one clearly deceased. A distraught bystander is screaming and you realise that the crash involves a family with whom you have socialised with recently in the community. Your heart rate increases so you take some slow, deep breaths and focus before introducing yourself to the lead ambulance clinician and asking how you can assist. They direct you to a patient who has significant burns and failed IV access. "He needs an IO doc"

Talk — Internal negative thoughts will degrade performance "This is going to be really difficult" "What will the Coroner say?". Elite athletes use positive self-talk to enhance performance and we suggest clinicians should do this too

This is an easy procedure. I have been trained to do this. I can get it done. The patient needs me to get it done. And I will do it. If I go slowly, take some deep breaths & mentally rehearse, then this will be easy

See — This is the ability of providers to visualise the steps of a procedure they are preparing to perform. Rehearsing in one's mind activates the same neurologic network needed to successfully perform a task, rather like a blueprint or instructional video

You mentally run through the procedure - identify landmarks, prep skin, push needle through skin to bone, then activate the drill until there is a loss of resistance, leave needle hub clear of skin, flush...as you ask paramedic to draw up ketamine whilst you place the IO

Focus — A trigger word or phrase will help recall full attention to the task at hand. It can be subvocalized, whispered, or simply spoken aloud. The word acts as a cognitive signal flare, prompting the provider to shift attention to a single, prioritized task

You pick up the IO drill and whisper 'smooth'. The word has the same effect now as it has had in your previous mental simulations.

Post-incident reflection - STEPS as a structure

The STEPS matrix also works well when applied to post hoc audit of performance after a prehospital call out, asking the question 'could anything be improved?' Consider this following example:

Self "Was I stressed? Did this affect my performance? My heart was racing and I felt pretty nervous when I had to do place an IO. I struggled with remembering how to place it and lost sight of the fact that the patient was deteriorating whilst we drew up drugs. How can I mitigate this?" [understanding the effects of stress on human performance is important - fine and gross motor skills can degrade, cognitive ability can decline, it is possible to become task-fixated and lose situational awareness. Other factors such as hunger, fatigue, mood and cold/heat can also degrade personal performance]

Team "It was hard to know who was who. I asked if 'someone' could get a stretcher but should have used a name. So I must work harder on closed loop communication next time" [the most common folk in a resuscitation are 'Someone', 'Anyone' and 'Lets'. Could someone get an IV? Does anyone have the drugs? Let's move! Instead use names and use 'closed loop communication'; "Sam, I want you to draw up 200mg of ketamine to a volume of 20ml with saline" "OK, so I'll draw up 200mg of ketamine in 20ml saline - would you like me to set up an IV?" - offer to 'upsize the order' when communicating]

Environment "It was cold and dark and I struggled to place an IO line on the floor. Next time we should extricate the patient rapidly to the back of the ambulance where there is light and warmth - then perform procedures at stretcher height" [rapid extrication to obtain 360 access, simultaneous packaging

with pelvic binder/vac mat/splints and bring the patient to stretcher height at back of an ambulance. This can offer protection from elements, lighting, optimise positioning and allow access to suction/ oxygen/aircon etc]

Patient "This patient had clear signs of compressible haemorrhage and we were able to manage this with direct pressure and an Israeli Emergency bandage. If that failed I could have used a tourniquet or clamped a vessel" [consideration of patient factors is familiar to clinicians]

System "The Sandpiper doctor was tasked appropriately. I wonder if we should consider a haemostatic dressing for future bleeds? I will raise this at local level with ambulance" [even small incremental changes driven by case examples can deliver huge benefits across an organisation - audit can help drive efficiency and safety]

2. Guiding Principles in Pre-Hospital Care

The following sections outline key competencies that are expected of the Sandpiper responder and are based on audit of commonly performed procedures in prehospital settings.

We recognise that clinicians will vary in experience and training. The motto of 'doing the basics, well' underpins the approach to much of prehospital care.

It is essential to ensure that Sandpiper clinicians 'value add' on scene and do not detract from other skills nor act outside of their role. As such this requires awareness of the contributions from other emergency services and awareness that role of the rural clinician is confined to a limited suite of meaningful interventions, required in a few select cases.

With such simplicity comes advantage - these interventions can, to a degree, be predicted and practiced. This may help mitigate some of the difficulties encountered in the chaotic prehospital environment.

As such, Sandpiper clinician involvement is predominantly focussed upon :

- assistance with on scene management, with an emphasis in ensuring clinical momentum
- zero point survey, SITREP and communication,
- initial patient assessment (primary survey)
- haemorrhage control
- splinting & packaging
- obtain or upgrade IV and IO access
- analgesia, particularly for extrication, fracture reduction and packaging/transport
- needle and finger thoracostomy
- basic and advanced airway

Again it is important to reiterate that Sandpiper clinicians must ensure they 'tread lightly' in the prehospital environment. Many agencies may be uncertain, suspicious or even downright opposed to the presence of a rural doctor on scene. Building relationships by making availability known to local ambulance, having familiarity with their kit and participating in training is highly recommended.,

As a senior clinician it is important that you are aware of the potential of the Sandpiper to add extra perturbation to the prehospital scene unless the role is understood by all that you are there to 'value add' only.

Please work collaboratively with agencies and individuals; offer support but do not act outside of your expertise (eg scene management, extrication) nor deskill existing providers by performing procedures they are already trained to perform (basic airway, splinting etc). This can be a particular issue when working with local community volunteer responders. While trained, they may look for leadership and adopt a follower role purely on the basis of your position as a community clinician. Be aware of this and work hard to acknowledge and develop their expertise.

"Offer support, but try to confine interventions to those that value add, not replicate"

Remember your performance on scene reflects upon the wider Sandpiper community!

2.1 The Zero Point Survey

Most hospital-based resuscitation training has focussed on an ABCDE approach to the sick patient. The primary survey assessment is a cornerstone of resuscitation processes. The name itself implies that it is the first step in resuscitation.

Resuscitation experts have argued that in an organised resuscitation the primary survey must be preceded by a series of steps to optimise safety and performance and set the stage for the execution of expert team behaviour.

Even in the most time critical situations, an effective team will optimise the environment, perform self-assessments of personal readiness and participate in a pre-emptive team brief prior to entering the scene or patient assessment. We call these processes the 'zero point survey' (ZPS) as it precedes the primary survey.

On occasion, resuscitation requires nothing more than opening the airway, administering oxygen, or providing vasopressor support. In these cases, a small team can prioritise the 'airway, breathing, and circulation' with all haste.

However, resuscitative form should follow resuscitative function, and the ZPS provides a cognitive roadmap better suited to modern medical reality. We are increasingly managing complex frail patients, large teams, and changing personnel. There is also a greater understanding of the importance of human factors, and the threat from diagnostic ambiguity, competing priorities, and cognitive bias. Accordingly, our shared mental models need to address both team-processes and task-based processes, and both technical factors and non-technical factors.

To add extra cognitive resilience and to ensure therapeutic momentum, we encourage responders to consider the value of a 'pause' before entering the scene and commencing "hands on" with patient

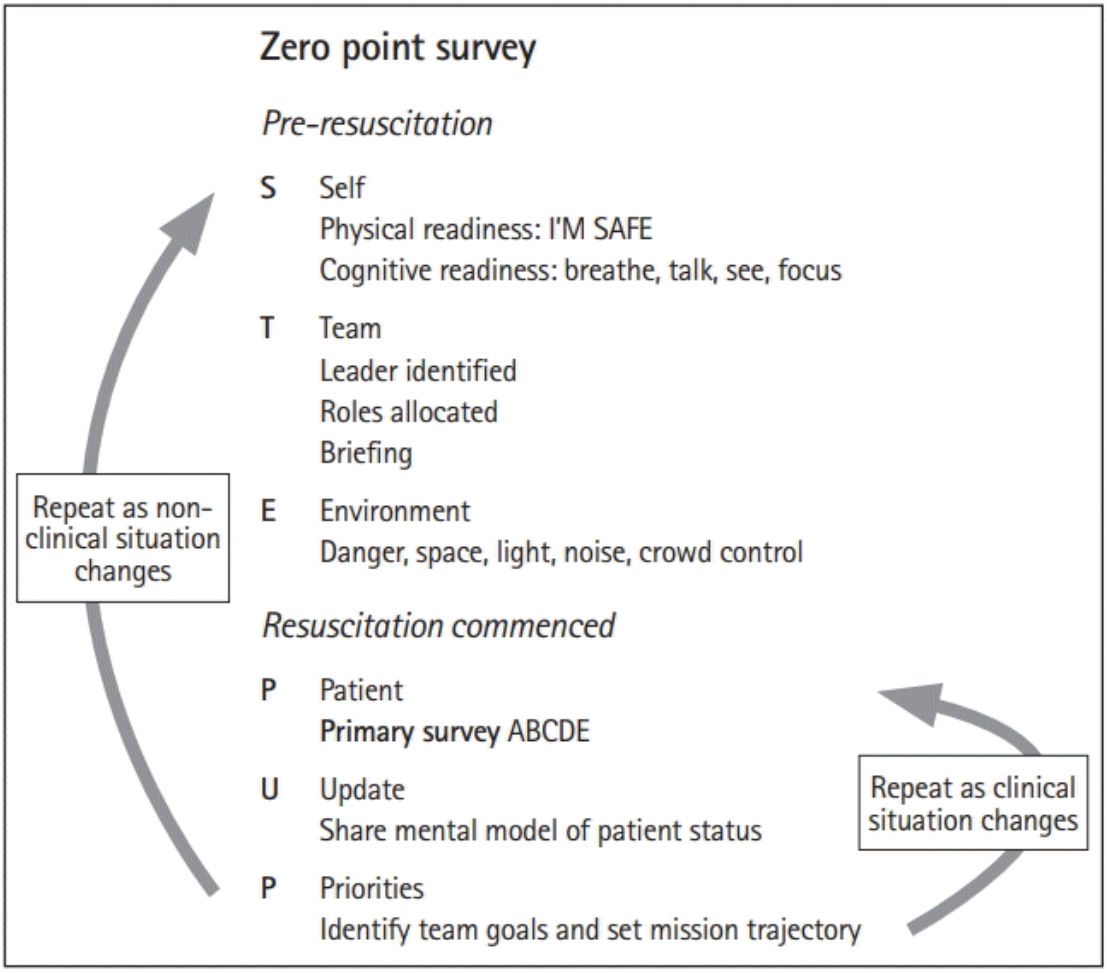
- check self, team, environment
- conduct an initial assessment using MARCH approach
- communicate (SITREP) early
- ensure no therapeutic vacuum and work to maintain clinical momentum (think 'where are we, where do we need to be?')
- communicate identified issues and goals to the team (share the mental model).
- outline the next three steps...

The period before first patient contact is an opportunity to appraise environmental, cognitive and team-based cues.

In many prehospital services, protocols typically mandate a focused and preemptive evaluation of scene hazards and key personnel, ensuring roles assigned and understood, an assessment of scene safety with underlying flexibility if circumstances change (typically governed by risks of extrication or risks of patient deterioration) as well as agreeing a shared mental model of common goals between rescue personnel.

For Sandpiper responders, we recommend the following STEP-UP matrix as an approach to the prehospital scene in the form of a zero-point survey:

Self check
Team brief
Environmental scan
Patient primary survey
Update (SITREP)
Prioritise actions....



From Reid, C et al (2018) Zero point survey: a multidisciplinary idea to STEP UP resuscitation effectiveness. Clin Exp Emerg Med. 2018 Sep; 5(3): 139–143. Published online 2018 Sep 30. doi: [10.15441/ceem.17.269]

In term of updating the situation and updating priorities, consider where you are and where you want the patient to be - remembering "the four Os" can help.

In brief, you want the patient to be :

- Oxygenated,
- Options (analgesia, haemorrhage control etc)
- On a stretcher,
- Out of there !

2.2 Management on scene

The role of the Sandpiper clinician is to 'value add' to the prehospital environment in his or her community. It should be recognised that the experts in prehospital care are the exisiting ambulance and prehospital/retrieval providers. As such the involvement of Sandpiper responders is likely to be limited to situations such as:

- available resources are not available (eg: local advanced paramedic elsewhere)
- the clinical needs of the patient require extra level of intervention not available (eg: additional medications or analgesia exceeding usual ambulance standard operating procedures, aggressive interventions such as finger thoracostomy, surgical airway, use fo advanced analgesia etc)
- situations where patient demands cannot be met by available resources eg mass casualty

Sandpiper clinicians should be trained to deliver a limited suite of defined meaningful interventions and offer an extra level of clinical expertise. Given the geography of Australia and the nature of small rural communities, we encourage Sandpiper clinicians to engage with local ambulance providers (whether volunteer or salaried) at an early stage to offer services as a clinical support. One of the most effective interventions that you can offer as a rural leader is to train with the local ambulance and indeed other emergency services. Over time your role will become accepted and understood, increasing the likelihood that local responders will request a Sandpiper clinician on scene via their tasking centre.

Preparation is the first step to safe practice and to keeping yourself safe. Ensure that you are familiar with the layout of your Sandpiper Bag and that all equipment is in working order and consumables such as medications have not expired.

- Frequent kit checks have many benefits, not least that this ensures familiarity with equipment location and layout in a crisis

- Preparing your kit also provides an opportunity to mentally rehearse and prioritise appropriate juxtaposition of equipment e.g.: placing safety glasses with gloves, placing sharps container with IV/IO access, having a 'first in' kit of gloves/headlamp/pulse oximeter/shears readily available in the top of pack, having Sharpie pens and paper available etc

- Practicing with the local ambulance team developed relationships, helps identify strengths and weaknesses in local capability and also allows a better understanding of roles and capabilities. Put simply, the local ambulance crew are more likely to call for assistance from Sandpiper if they understand that your role can 'value add' to the patient front of them rather than be a potential distraction or unknown quantity.

Communication systems and command and control systems may vary from State to State. You need to be familiar with the system in your own area in order to

- receive tasking and confirm response to an incident
- send and receive information about an incident
- maintain a record of the response to an incident

Cross-training with local emergency providers is one of the most important interventions that a Sandpiper clinician can hold. Many rural clinicians offer their time to train local ambulance and to receive training from the service; some may hold a position as volunteer ambulance officers or be granted 'authority-to-practice' by the ambulance service (usually requires a period of training and sign off at an organisational level).

We recommend that rural clinicians participating in such work forge relationships with ambulance services at a local,& State level, supported by advocacy from community & professional bodies

This advocacy & integration is especially important in wake of the findings of the 2020 Royal Commission into National Natural Disaster Arrangements, highlighting a need to integrate primary care into emergency systems. Whilst integration of rural clinicians at a State level may be slow, by building relationships with local ambulance crews, it may be possible to encourage them to encourage their tasking authorities to "task the doctor to scene" and - over time - change practices 'ground up'. As part of that, we ask that Sandpiper clinicians familiarise themselves with ambulance protocols and communication and ensure they are 'dressed to impress' on scene.

Personal protective equipment is essential. Whilst the typical dress code of the rural doctor may be considered 'relaxed' (varying from RM Williams strides, shirt with collar and boots...through to board shorts, T-shirt and thongs), this is clearly inappropriate attire for the prehospital environment.

PPE should include boots, hard-wearing trousers with knee protection, shirt, reflective jacket or vest, hard hat, headlight, riggers gloves, disposable gloves, sun screen, insect repellent etc. Having a small 'turn out' bag containing PPE stored with your Sandpiper Bag is recommended, along with a stash of water and non-perishable food.

A small 'first in' kit of gloves/shears/pulse oximeter/haemorrhage control/headlamp/sharpie pen/labels' may be a worthwhile addition to jacket pocket. Your role needs to be clearly identifiable and your PPE should ensure adequate protection for the role undertaken.

Leadership on scene can be a source of confusion for those not experienced in the prehospital environment. Most rural clinicians are recognised as the team leader in their emergency department role, in their clinic and in their community. However expertise in the hospital setting does not translate to the prehospital environment. Your role is strictly limited to providing meaningful clinical interventions, not to 'be the boss'. Indeed autocratic or non-expert assumption of a leadership role by a doctor on scene can comprise safety, destroy effective teamwork and risk reputational damage.

Police will usually control access to the scene with responsibilities for crowd control and traffic management - remember also that in the case of death or assault, there may be a need for subsequent forensic investigation. Driving over skid marks or debris on both access and egress from a road crash is strongly discouraged - follow the directions of on scene personnel and ensure that you are parked safely, are mindful of potential hazards and do not enter the scene unless wearing identifiable PPE.

Typically the Country Fire Service or State Emergency Service will have responsibility for the prehospital scene, and will have an Incident Commander who will declare the scene safe or unsafe to enter. Rescuers from all organisations must follow the directions of the scene commander, who should be identifiable by a tabard and/or white helmet.

Once granted permission to tender the scene, responders should report to the Ambulance Incident Officer (AIO). In the initial stages of an incident this may be the crew of the first ambulance on scene; at a complex incident additional crew are invariably likely to respond, and the role of AIO may mature to another clinician, identifiable by a tabard.

Effective teamwork can be a challenge in the chaotic prehospital scene. Not only is their situational urgency, there may be competing management priorities (police may wish to secure the scene, fire may be focussed on safety and extrication strategy, clinical personnel will be focussed on patient assessment and treatment). There may be difficulties in regard to communication, goals and competing management priorities - with resultant frustration, cognitive overload, divergent planning and risk of error

Consider a complex prehospital scene. Many individuals will arrive - this may include bystanders, impromptu responders, and immediate responders. Everyone will want to help and be involved, but the scene commander must keep one step back and decide what needs doing, who does need direct involvement and when it is safe to do so.

As a doctor you will naturally wish to evaluate casualties and institute management; however taking time to confirm scene safety, confirm your role and establish priorities is a necessary pre-requisite.

Furthermore, even if you have been granted access to the casualty, determined an immediate life-threat and then performed a meaningful intervention (eg decompressed a tension pneumothorax on an entrapped victim), once this has been completed you may have little to add in the immediate short-term and now be in the way of rescuers tasked with extrication.

Effective communication, sharing the mental model, closed-loop language and agreeing next steps is vital to ensure both good leadership and followership.

Summarise and share information, with concomitant goal setting for all team members.

These teamwork techniques can be practiced safely in the crucible of interdisciplinary simulation.

If it is not essential to be involved immediately 'hands on' with a casualty, then take a step back - move your equipment if it is causing an obstruction (having a 'kit dump' in a safe place is recommended) and let the extrication proceed.

If you do need to be involved, then do everything you can to keep the extrication and treatment process moving along, preferably with simultaneous assessment, treatment, packaging and extrication.

Be very aware that performing procedures - even as simple as applying oxygen, placing IVs and physiological monitoring - can cause significant delays in extrication.

Always ask yourself 'Is this procedure or assessment essential right now, or is it delaying the extrication and rescue?". Work as part of the team, not against it!

A 360 degree survey is a essential cognitive waypoint before entering the scene, even if responding as an impromptu or immediate responder before other agencies. Rescuers should not proceed until hazards are identified and communicated.

Common hazards may include traffic, presence of machinery, fuel, fire risk, underplayed airbags, weather conditions or crowds.

On a simple scene the 360 degree survey may take place rapidly; on more complex scenes this may require a more thorough scene assessment and as further help arrives it may be sectorised. The 360 assessment is an ideal time to enact the 'zero point survey' described previously and consider access/ egress and kit dump locations.

Dynamic risk assessment is the continuing process of identifying hazards, assessing the risk the pose and taking steps to mitigate against them whilst performing the rescue. A hazard is a danger something that has the potential to cause harm. The risk is a measure of the likelihood of that hazard actually causing you harm and how great that harm may be. Ensuring safety is a responsibility of both the individual and of the team.

Establishing an exit strategy is recommended even as you enter a scene, should you need to leave the scene quickly. It is also worth considering how the patient will leave the scene and position equipment and vehicles accordingly.

Generally patients will be extricated 'in line' to minimise disruption of spinal or bony injuries. Thus it may be worth bringing a scoop or stretcher close to the patient, such that they can be extricated from the immediate scene (eg vehicle) onto this in a linear manner.

Placing a vacuum mattress, with pelvic binder already laid out, on a stretcher at knee height placed close to the vehicle may further reduce patient movement.

The stretcher may then be brought to operational height, moved to the rear of the ambulance (a source of oxygen, suction, lighting, shade and temperature control) and then meaningful interventions performed before loading and rapidly existing the scene, preferably without requiring further vehicle manoeuvres.

Taking time to surveil the scene as you enter allows you to gather information and is good preparation should a rapid exit be required. Consider available exits. Are there people who can facilitate this eg turning on lights, clearing debris, controlling traffic?

In the case of confined spaces or where cutting equipment is being used, consider making a kit dump outside the immediate scene, but also ensure that precious equipment (and in particular drugs) are not left unattended as a temptation to unscrupulous passersby!

Identifying potential hazards (not least risk of fire, hazards such as unsecured debris, presence of uncontrolled animals [beware horses!], inclement weather conditions or risk of patient deterioration) can all be tipping points to demand a rapid exit from the scene.

For patients with poly-trauma, a general principle is to minimise handling (a risk of 'popping the clot').

Scoop stretcher - patients on the ground are best removed using a scoop stretcher, then carried to a nearby ambulance stretcher. The minimises the risk of disruption to spine, to any injuries (in particular pelvic and long bone fractures) as well as reducing the risk of dislodging haemostatic clots.

Despite the teaching of ATLS-EMST, log-rolling is generally avoided unless risk of immediate compressible haemorrhage hidden from view (eg stabbing incidents or impalements) as there is a significant risk of worsening venous bleeding from injuries.

As such most patients will be extricated in a controlled manner, usually aiming to extricate in-line to minimise risk of spinal damage. This may necessitate considerable time and effort by road crash rescuers, including cutting of door pillars, removal of roof or other manoeuvres (see 'Vehicle Extrication'). All of this takes time.

Of course, if the vehicle is on fire or the patient is peri-arrest, then spinal precautions may need to be abandoned and a 'snatch and grab' performed. Careful consideration of risk to self and patient, as well as clear articulation of why such a desperate manoeuvre is necessary, must be calmly articulated to all rescuers.

Conversely, those patients who are able to self-extricate and maintain appropriate protection of injuries (including cervical spine) should be encouraged to do so, without necessarily cutting apart the vehicle!

Manual handling considerations are important, with significant risk of damage to backs (through lifting or twisting), heads (through impact on obstacles) or cutting (glass, unprotected metal etc). There is always a danger of passing traffic or unsecured building, debris, animals or angry crowds. Helmet, knee pads, debris-gloves, enclosed boots and full protection of arms and legs is vital.

As a general principle, patients should be moved as little as possible - each transfer from vehicle to scoop, scoop to stretcher, stretcher to ambulance, ambulance to airframe, airframe to ambulance, ambulance to ED resuscitation bay, ED to OT, OT to ICU etc is an opportunity to cause harm to the patient...and to cause injury to staff!

If lifting a patient, enlist support from as many able-bodied personnel as possible. CFS, SES, Police or even bystanders may be enlisted to form a team to lighten the load. However there is always a risk - movement of the patient needs to be in a controlled manner, not ad hoc.

Controlled manoeuvres in patient transfer

Whilst many clinicians seem to use the 'Let's move on 3...1, 2...3!' approach, there is often confusion - do team members move on 3? Or on the implied '1, 2, 3...move?'. A simple order can be misinterpreted and cause patient harm.

<u>Explicit command language</u> is recommended for moving patients. This usually involves a quick brief, confirmation that pelvic floors and backs are engaged, check of readiness (to avoid movement whilst lines are being untangled or rescuers not engaged) and then enacting the command using precise terminology:

- Brief 'The command will be READY-BRACE-LIFT' (or MOVE, SLIDE')
- Ensure readiness 'Is everyone ready?' (stop & wait for a response from all team)
- Enact the command 'OK team. Ready. Brace...LIFT'

The use of explicit command language can be practiced in the OT, ED or wards when moving patients and is highly recommended over the ambiguous '1-2-3'

Infection control & sharps

Infection control measures are familiar from the clinic or hospital setting. The same principles apply in the prehospital setting. This can be complicated by the presence of dirt, glass, blood or even insects! Gloves should be worn whenever there is risk of bodily fluid contamination. Alcohol-based gels or wipes may be useful in lieu of formal hand washing facilities.

Before performing an invasive procedure, ensure the site is clean. Lay out equipment and use sterile gloves. Plan for how you will dispose of sharps and contaminated items.

"Your waste, your responsibility"

The decision to perform an invasive procedure may considerably delay scene time. Setting up to establish IV access in an entrapped patient, in the dark, in the rain whilst still in the vehicle may take longer than usual and there is a high probability of the IV being dislodged during extrication. Always ask yourself "Is this procedure really needed?"

It may be simpler to administer inhaled (methoxyflurane), or IN or IO analgesia to facilitate extrication, then remove the patient to stretcher height and into the warm, dry, well-lit ambulance to place a secure IV, with the added advantages of spare equipment, sharps bin and less chance of dislodgement. However the same patient entrapped with a tension pneumothorax requires immediate needle decompression, despite the dark, rain and limited access.

Always have your torch and gloves ready, as well as means to prep the skin and perform the required interventions when needed!

2.3 Communication & SITREP

Effective communication begins at the time of the initial request to attend the prehospital scene. As a minimum you should confirm your name, location, expected time of arrival and capability. It is OK to decline to attend if intoxicated, fatigues or currently caring for another patient or community. It is prudent to confirm how you will be travelling (ambulance or police car, rendezvous en route or use of own vehicle) as well as how you will be maintaining contact (mobile phone, radio, sat phone or relay).

Initial information to emergency services from the scene is often scant. It is not uncommon to be tasked to a scene with only minimal information available (eg collapse, traffic, unconscious, mental health, breathing etc.) based on information supplied from anxious lay responders dialling 000.

As further information becomes available this will need to be relayed to the Emergency Operations Centre to help determine appropriate tasking of assets.

Some notifications may be sufficient to prompt an escalated level of care and retrieval activation. Typically these triggers will include particular injury patterns or mechanisms (stabbing, rollover, burns), high-risk patient groups (paediatric, obstetric, mass incident) or derangement in clinical signs (respiratory rate, presence of cyanosis, hypotension, altered GCS).

VITAL SIGNS

	Adult	Child (< 16yrs)
Respiratory rate	< 10 or > 30/min	< 15 or > 40/min
Cyanosis	Present	Present
Hypotension	< 90mmHg	< 75 + age of child in yrs
Conscious state	GCS < 13	GCS < 15

al activatic

INJURY

- Penetrating injuries (excluding isolated limb)
- Major blunt injuries or fractures
- Limb threatening injuries
- Spinal injury
- Burns > 20%

RISK

- Patients with high risk mechanism of injury whose vital signs deteriorate

OTHER

- Patients for whom trauma management or advice is required
- Multi-victim incidents where early response of additional clinical staff for assistance or retrieval is required

Limited information from the rural community prehospital notification 'high speed rollover, numerous casualties, one deceased on scene' may be sufficient information to activate a retrieval. If further information becomes available ('all passengers exited vehicle, no deceased, minor injuries only') then the retrieval may be stood down.

Responders are often tasked to an incident with minimal information. Use what little information you do have to mentally rehearse. Prior notification of injuries may engender specific likely courses of action, equipment needs and interventions, as well as likely disposition. However do not be surprised if the injuries on scene do not match the initial call - and be especially wary of diagnostic momentum taking you down the wrong path!

One of the most valuable contributions that a Sandpiper responder can make is to provide a senior clinician overview of the situation. We recommend making such situation reports ('SITREP') notifications as early as possible, through standard channels (ie ambulance communications) which may require relay via on scene ambulance personnel who can utilise their radio network.

There is a tendency for the prehospital incident to become an information 'black hole', with the complexities and demands of the scene drawing clinicians into their usual and familiar roles of assessment and treatment. Such task focus risks a loss of situational awareness, namely the urgent need to communicate information to the outside world.

It is vital that you remember to provide a SITREP as soon as possible, preferably using a structured approach such as ATMIST-AMBO, ISBAR or in the case of mass casualty, METHANE.

AT-MIST-AMBO		
	Age	Allergies
	Time of incident	Medications
	Mechanism	Background
	Injuries	Other
	Symptoms & Signs	
	Treatment	

eg "We have a middle aged male, involved in a fall from 4m height approximately 20 minutes ago. He has sustained a possible fracture to his left femur and a closed head injury. He is complaining of severe pain and appears confused with GCS E4V4M5. I plan to give some fentanyl for analgesia and reduce his fracture with a femoral traction splint. He has no allergies, but importantly he takes clopidogrel for a background of ischaemic heart disease. He will require a retrieval team for urgent transport in regard to possible intracranial bleed and may require a neuroprotective anaesthetic if the GCS deteriorates."

ISBAR	
	Identify
	Situation
	Background
	Assessment
	Requirements / Read back

eg "It's the RERN doc for Dingo Creek here, with patient Julia Foal, a 15 year old who has fallen from her horse and been trampled. She is usually fit and well. I am concerned regarding injuries to her head, chest and abdomen. She will require evacuation - I plan to assess her GCS, role out haemo/pneumothorax and evaluate for solid organ injury and bony fractures. Stand by for an update in 5 minutes. Please confirm."

METHANE	
	Major incident declaration
	Exact location
	Type of incident
	Hazards present or suspected
	Access routes that are safe
	Number, type, severity of casualties
	Emergency services present and those required

eg "It's the RERN doctor from Kickatinalong here. I am declaring a major incident, the exact location being 3km south of the township on the Big Smoke highway. This is a road traffic incident, with a bus vs petrol tanker. Hazards include an unsecured scene; the fuel tanker appears intact but the bus has rolled onto it's side and is resting on an embankment with a risk of rolling further.

"There is access via road from Kickatinalong in there north, and south from Big Smoke, but the main highway will need to be closed. There is a dirt airstrip approximately 4km to the west, via Big Sky Station which has been used in the past by RFDS, but is rated for day landings only.

"I estimate approximately 20 patients, with head, chest, abdomen, pelvic and long bone blunt trauma. There is one confirmed deceased on scene and at least five critically injured, further SITREP to follow.

"So far we have the park ranger on scene and several bystanders, as well as local police, road crash rescue, volunteer ambulance (one vehicle) and myself. We will require as many ambulances as you can mobilise from nearby towns, SES and CFS to help secure the vehicle, options for fixed-wing retrieval and major incident controllers as soon as possible"

In summary, delivering a SITREP and using a structured approach can greatly help those in the Emergency Operations Centre. Time spent in early SITREP will pay dividends with early mobilisation of extra resources and the potential for expert advice if needed. Our advice is to SITREP early and often!

An ABC (Accuracy, Brevity, Clarity) approach to communication should be remembered. On occasions it may be difficult to communicate effectively, particular with the spelling of names and locations. An awareness of the NATO phonetic alphabet is useful and included for reference.

Phonetic Alphabet

A - alpha	N - november
B - bravo	O - oscar
C - charlie	P - papa
D - delta	Q - quebec
E - echo	R - romeo
F - foxtrot	S - sierra
G - golf	T - tango
H - hotel	U - uniform
I - india	V - victor
J - juliet	W - wiskey
K - kilo	X - x-ray
L - lima	Y - yankee
M - mike	Z - zulu

Awareness of common communication procedure terms is useful:

ROGER	This is a method of receipt. I have received your last transmission satisfactorily
OVER	This is the end of my transmission to you & a response is necessary. Go ahead, transmit
WILCO	I have received your signal, understood it and will comply. To be used only by the addressee. Since the meaning of ROGER is included in that of WILCO, the two pro-words are never used together
OUT	This is the end of my transmission to you and no answer is required or expected
WAIT	I must pause for a few seconds
I SPELL	I shall spell the next word phonetically
SAY AGAIN	Repeat all of your last transmission
CORRECTION	An error has been made in this transmission. Transmission will continue with the last word correctly transmitted
CORRECT	Yes, affirmative, you are correct, or what you have transmitted is correct. Because AFFIRMATIVE could be confused with NEGATIVE, always use CORRECT instead of YES or AFFIRMATIVE
NEGATIVE	No or negative

2.4 Patient extrication & maintaining scene momentum

It is not uncommon for patients to be entrapped on scene, hindering assessment and the ability to perform meaningful interventions. Such patients will require extrication, which is a task best left to the experts (CFS or SES, depending on jurisdiction).

Entrapment in the wreckage of motor vehicles is common, but other predicaments may present themselves, eg entrapment under a tree or fallen masonry, limbs entangled with machinery, injuries in unusual locations (at bottom of cliff, thrown into prickly scrub, fall into a well, suspension from gantry or injury in a confined space).

Even a collapse in a small bathroom or upstairs hotel room may pose difficulties. The ambulance service are the experts in prehospital care and we recommend learning from them and utilising their expertise on scene.

A general question to ask oneself on scene is
"Where are we and where do we want to be?"

Sadly we will often be somewhere we don't want to be (eg trapped, upside down, covered in faeces) and it is natural to want to be somewhere nice (a place with access to oxygen, suction, temperature control, plenty of equipment & help) ie an ambulance or ED!

There may be a conflict between the priorities of the extrication experts and the clinical experts. The former may be aiming for a controlled extrication, minimising risks from existing hazards - whilst the clinical needs of the patient may be under-appreciated

It is usually up to the clinician to determine the rapidity with which the extrication process happens and remain generally 'hands off' unless there are immediate needs. Placing a pulse oximeter, administering inhaled (methoxyflurane) or intranasal or even intraosseous medication and maintaining verbal contact (reassurance as well as monitoring mentation) may be the maximum that is possible or necessary, as opposed to placing ECG leads, inserting IVs and performing a full physical examination. In short, allow the experts to perform the extrication and maintain surveillance, only intervening if the clinical situation deteriorates.

An excellent introduction to vehicle extrication is found at Calland (2005) 'Extrication of the seriously injured road crash victim'. For extra detail and nuance, we recommend Ian Dunbar's book 'Vehicle Extrication Techniques', which is available in both hardcopy and eBook format or the more recent 'Vehicle Extrication - the Next Generation' (2020).

Ian Dunbar's two books 'Vehicle Extrication Techniques' (in partnership with Holmatro) and 'Vehicle Extrication - the Next Generation (in partnership with Lukas) are highly recommended

Key concepts include the four stages of rescue:

- establishment of scene safety and contact with the casualty to ensure airway control and protection of the cervical spine;

- stabilisation of the vehicle and glass management;

- gaining of entry to the vehicle and continuing stabilisation of the casualty; and

- space creation to allow casualty extrication.

Clearly extrication and clinical management do not exist in isolation - rather they should be considered in tandem. It behoves the clinician to understand the principles of vehicle extrication - and the road crash rescuer to understand how extrication can impact on the patient within.

Remember that entrapment may be due to being physically trapped (eg high energy crash with driver entrapped by steering wheel and dashboard) or medically trapped (low energy crash but patient cannot extricate due to severe pain). Often both occur.

Access to the casualty may be obtained by a variety of techniques, often involving removal of door pillars (B pillar rip), the roof or footwell clearance. Potential hazards include glass, sharp metal edges, cramped spaces, fuel, unexpected airbag deployment and vehicle movement. Complicating factors include the ubiquitous Australian Ute (where egress via rear may be difficult), electric cars with fuel cells and larger vehicles such as minivans, small buses etc.

A general principle of patient extrication is to remove in such a manner as to minimise spinal movement. Typically this may involve an 'in line' extrication through the rear window. Alternatives may include a rear-quarter oblique extraction (exit via the opposing rear door). A rigid extrication board (formerly referred to as a 'spinal board' incorrectly) may be used - the seat is laid down and patient moved in a linear manner from recumbent seat to extrication board, as a bridge to a stretcher at knee height with vac mat and pelvic binder ready.

In this exercise, the simulated patient is being extricated via the rear on a rigid extrication board.

Inline immobilisation of the cervical spine is being applied by hand. A conscious patient may self-protect their C-spine.

A semi-rigid collar may be required if unconscious during the extrication phase.

Spinal precautions are of course important. Use of cervical collars may vary between States, with increasing understanding that a semi-rigid collar is a marker of potential spinal injury and does not necessarily immobilise the cervical spine.

Alternative forms of immobilisation exist. Conscious patients with no distracting injury, nor intoxication nor neurological deficit may be able to exit the vehicle themselves and self-protect their cervical spine. Those with some pain may benefit from a soft cervical collar (as used in Queensland). Check the policy

in your State ambulance service.

Unconscious patients may require rapid immobilisation in a vac mat and use of rolled towels to prevent 'lolling' of the head during transpor.

Patients with altered conscious state or agitation may require assertive reassurance and use of manual in line immobilisation during the extrication phase only.

Anecdotes exist of gleeful road crash rescuers dismantling police vehicles, in which low impact (rear end shunt) victims have been moved to police vehicles and sat in order to give accident details...then developed musculoskeletal neck pain...and an unstoppable force of 'maintain spinal immobilisation & inline extrication' has swung into gear!

Pictured: Firemen forced to cut off roof from £16,000 police car to rescue injured woman

By DAILY MAIL REPORTER
UPDATED: 22:04 AEDT, 12 November 2008

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Firemen had to cut the roof off a £16,000 police car to get to a crash victim with back injuries who officers had put inside for her comfort.

The two-year-old estate patrol car was a write-off after firefighters used specialist cutting gear to allow the injured woman to be carried out on a spinal board.

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She was put in the police car for her safety amid fears she would collapse.

But paramedics decided she needed to be removed from the vehicle on a spinal board - and as a result the roof had to be cut off.

The public and emergency services are regularly warned to leave people with back injuries alone in case moving them makes them worse.

But Supt David Marshall, of Norfolk Police, defended the traffic officers' decision to sit the woman in their car.

The senior officer said: 'Our priority is always the public of Norfolk. In this incident the actions of the officers at the scene once again reinforces this.

'The victim's vehicle received rear-end damage and the woman driver was suffering from shock and was disorientated.

The 16,000 police car was a write-off once firemen had finished

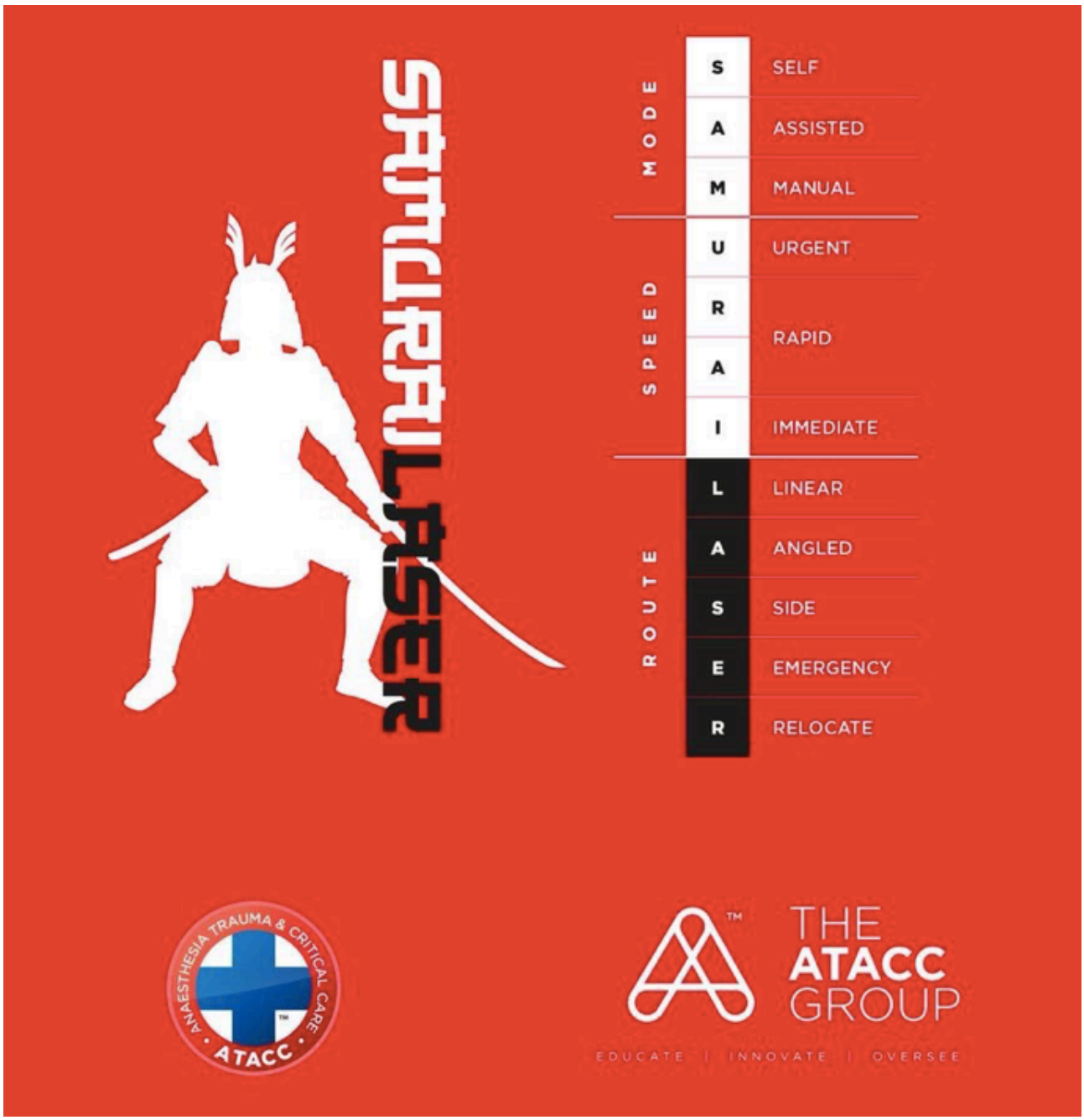
Beware the patient who moves from crash vehicle to emergency services vehicle - and then develops neck pain requiring in-line spinal immobilisation, vehicle disassembly and extrication!

At the other extreme, there may be post hoc criticism where a 'snatch and grab' extrication has been performed due to imminent threat (fire, or peri-arrest). A failure to communicate the urgency to other team members has lead to subsequent censure as 'no spinal precautions were taken'.

A recent concept championed by the ATACC faculty in the UK has been to consider the relative importance of balancing the appropriate method, speed and route of extrication, understanding that the importance of mandatory spinal immobilisation may be countered by consideration of patient factors.

They encourage consideration of MODE - SPEED - ROUTE of extrication

Mode	Self, Assisted, Manual
Speed	Urgent, Rapid, Immediate
Route	Linear, Angled, Side, Emergency, Relocate



SAMURAI LASER concept from ATACC (UK)

If your role on scene becomes that of the senior clinician, perform a quick 'group huddle' with the team leader in charge of casualty extrication. Ask specifically

> "What is your primary plan to extricate this casualty?"
> "What is your alternate plan if we need to extricate more rapidly?"

Continue to communicate with the casualty, with road crash rescuers and ensure that patient welfare is balanced with the momentum of the extrication.

Hopefully it will become apparent that the dynamic between extrication and patient condition can be complex and unpredictable, depending on the nature of the collision. The natural inclination of a clinician is to get early access to the casualty and commence assessment and monitoring. Whilst early access to the casualty is lauded, this must not be at the expense of personal safety.

Moreover the early tethering to safety of oxygen, IV access and full physiological monitoring which is mandated in the ED, may cause a counter-intuitive and potentially deleterious delay in extrication due to presence of clinician, monitors, oxygen and lines etc which may hinder extrication efforts.

A rapid clinical assessment should be performed to guide urgency of extrication and perform only those procedures that may value add. These may include

- immediate control of compressible haemorrhage
- early use of jaw thrust and placement of oro- or naso-pharyngeal airways
- consideration of spinal precautions
- assessment of ventilation and placement of needle thoracostomy if tPTX suspected
- placement of humeral IO if rapid access to circulation is needed e.g. medications
- selective use of analgesia to facilitate extrication; intranasal, inhaled, intraosseous
- appropriate monitoring eg response to voice, pain, pulse oximetry

For every minute spent performing assessment or interventions, expect to add another 7-8 minutes delay to extrication! A quick "five minute" clinical assessment may cause over 30 minutes delay!

In general, if an intervention is not needed and the patient's condition is considered 'stable', then a hands off approach can be taken (mindful that stables are generally dark places full of horse shit). Frequent reassessment is essential.

Whilst the extrication is progressing, the Sandpiper clinician may be better served setting up for advanced procedures and 'making things happen'.

As a minimum, confirm the plan for extrication accords with patient condition. Ensure that a stretcher is available with vac mat and pelvic binder ready. Have a kit dump available for intervention such as IV access, chest decompression, airway management etc. Ensure this is protected from inadvertent foot prints of rescuers.

Drugs should be drawn up and doses crosschecked. A SITREP update may be given. Plans to move the patent rapidly to the ambulance and egress from the scene should be agreed.

General principles are to ensure that there is no 'on scene inertia' nor a 'therapeutic vacuum'. Delegate tasks to the appropriate agency and ensure that all personnel are utilised to their full capabilities.

It is important to ensure the Sandpiper-clinician works harmoniously with all team members and does not replicate procedures or responsibilities that are capably performed by others.

"Your role is to 'value add' on scene, not duplicate tasks performed by others"

2.5 Mass casualty & triage

During a mass casualty incident the aim is ensure the maximum good for the maximum number of casualties, with available resources. A major incident is one where the number or nature of casualties exceeds the rate at which routine system resources can deliver.

For the small rural community with only one ambulance, this may be as simple as five patients in a high-speed rollover. Early communication allows other assets to be mobilised. A METHANE report is essential.

METHANE	Major incident declaration Exact location Type of incident Hazards present or suspected Access routes that are safe Number, type, severity of casualties Emergency services present and those required

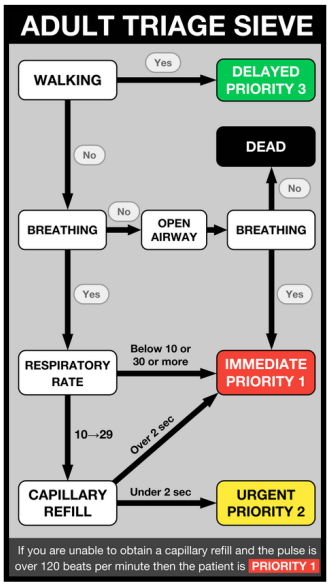
In order to minimise morbidity and mortality (maximise outcome despite limited resources) a field triage is required. The initial responder may be best placed to do a rapid walk through of the scene, counting casualties before updating the SITREP.

Sieve and Sort

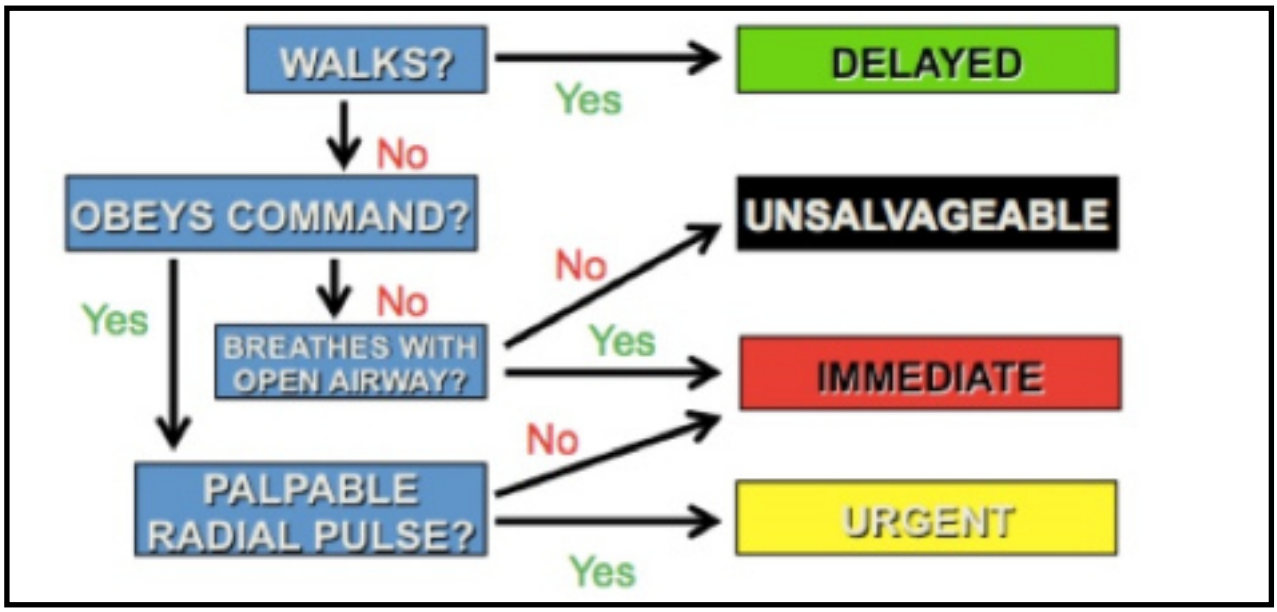
Standard triage sieve aims to separate the injured into one of four groups to determine treatment priorities, recognising that without an initial 'sieve' of casualties, rescuers may become stuck performing aggressive interventions on one patient, at the expense of all others. The sieve assessment is based on :

- walking?
- breathing?
- airway open?
- respiratory rate < 10 or > 30?
- capillary refill < 2 secs?

Importantly the sieve process requires calculation of respiratory rate and capillary refill in order to classify patients into groups.



Some agencies (eg NSW Careflight) have recognised that reliance on calculation of respiratory rate may cause unnecessary delay and have modified their sieve process accordingly. (see over). This may be easier to recall under pressure and hence more useful.

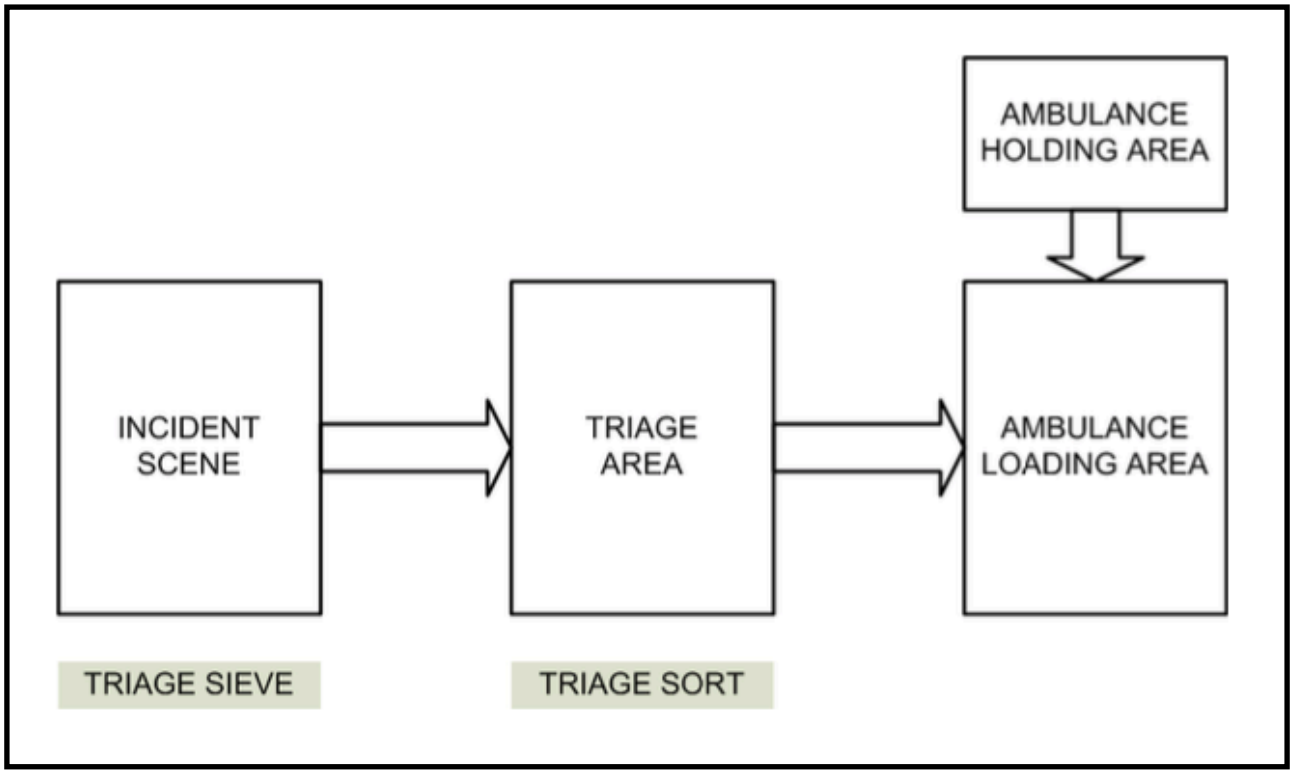


The Careflight 'sieve' tool does not rely upon calculation of respiratory rate nor capillary refill and may be easier to recall and implement in an emergency.

It is recommended that Sandpiper clinicians have ready access to cognitive aids to assist with triage sieve in an emergency

On approach to a major incident, consider carefully the geography and suitable staging areas. The incident scene is, by it's very nature, defined by circumstances.

Triage sieve will occur on scene. Triage sort may occur outside in a dedicated triage area; this may change according to circumstance eg: fire can break boundaries, rains may cause flooding etc.



There needs to be a defined area for ambulance loading from the scene. for evacuation from the scene. The deceased are left in situ.

Following the initial sieve, a subsequent sort is required. This aims to determine priority

Those patients who are 'priority one' are evacuated as soon as possible, recognising that their condition is critical and advanced interventions are needed. These patients are most likely to benefit from the advanced interventions of a prehospital and retrieval service - if delay is anticipated, then the local Sandpiper clinician may be best placed to deliver meaningful interventions on the scene.

Urgent (priority two) patients can have their medical evacuation delayed until all immediate patients have been transported. Rural clinicians in rural hospitals may be tasked with managing these patients.

Priority three patients are not evacuated until all immediate and delayed patients have been moved. They may not need medical attention for some hours.

At any incident you must ensure you are identifiable as a clinician. Duties include supplying scene commanders with information on patient numbers, carrying out a triage sieve, allocating priorities to each patient and performing any immediate life saving procedures that cannot be delegated to appropriately trained personnel..

ADULT TRIAGE SORT

	RESPIRATORY RATE	
TOTAL SCORE < 10	10-29	4
	>29	3
PRIORITY 1	6-9	2
	1-5	1
	0	0
	SYSTOLIC BLOOD PRESSURE	
TOTAL SCORE = 11	>90	4
	76-89	3
PRIORITY 2	50-75	2
	1-49	1
	0	0
	GLASGOW COMA SCALE	
TOTAL SCORE = 12	13-15	4
	9-12	3
PRIORITY 3	6-8	2
	4-5	1
	3	0

Liaise back with scene commander and together, agree on the relevant resources required at the scene for the SITREP. At smaller incidents you will simply be treating a patient(s). At major incidents you will direct arriving crews to patients and responding 'as needed' to perform meaningful interventions only.

Additional considerations in a mass casualty situation include role delineation. The mnemonic CSCATTT may be used to prioritise tasks to be performed on scene:

Command-Safety-Communication-Assessment-Triage-Treatment-Transport

What does this mean for the Sandpiper clinician?

At it's simplest, remember on arrival to confirm who is in command and liaise with them.

Is the scene safe? Communicate early via SITREP, before commencing assessment using triage sieve. Treat using basic interventions and expedite early transport.

Command and control

You may also hear the terms 'bronze', 'silver' and 'gold' in reference to command. These correspond to operational, tactical and strategic roles respectively.

Consider a major incident in a rural area, such as bushfire, earthquake, cyclone or bus crash. The ultimate response is likely to involve multiple crews from many emergency services.

Overall control of the scene is the responsibility of the police who will control the outer cordon. Ideally there will be a police manned incident control point through which all staff should enter and leave; all movements will be logged.

If hazards are present, the Fire Service will have responsibility inside the inner cordon (the hot zone) until the danger is controlled. Personnel entering and leaving the inner cordon must also be recorded for safety purposes.

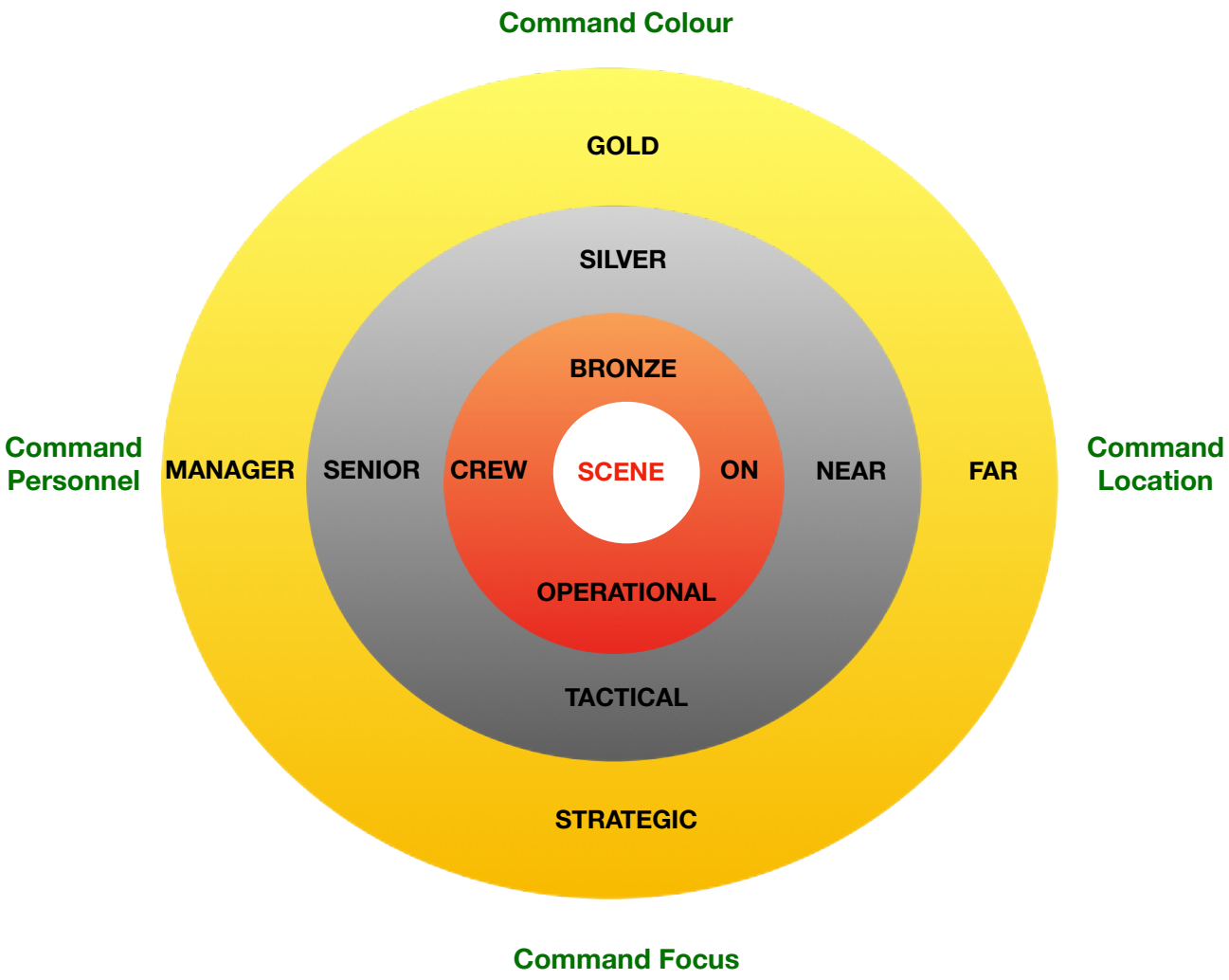
The bronze (operational) area lies within the inner cordon and is the area where the rescue operation is in place. There will be bronze commanders (forward commanders) from each emergency service.

Silver (tactical) command consists of the area within the outer cordon. The commanders from each service will be within this area, although they may move in and out of the bronze zones.

Silver command is usually handed over to more senior officers as they arrive. Commanders must not become involved in the rescue or treatment of casualties. There must be frequent documented meetings between the silver commanders from each service. The first priority is to share intelligence and establish what has happened.

Gold (strategic) command is removed from the scene - usually in Emergency Operations Centre or local authority buildings – and is the location where the chief officers from each emergency service meet.

Schematic demonstrating command colour, location, personnel and focus



2.6 Documentation and debrief

Good medical practice requires the completion of contemporaneous medical notes. It may be difficult to complete documentation on scene due to the inherently chaotic nature of the prehospital environment, limited personnel (often no scribe!) and of course situational urgency requiring simultaneous assessment, treatment and communication. Nevertheless, written information should be provided for handover to the receiving facility (eg to confirm patient details, injuries, treatment given to date). Ideally this should be completed using a standardised form - the ISBAR format lends itself to this.

In truly time-pressured or austere circumstances, the humble Sharpie pen can be used to note details - either on the patient, on clothing or on bedsheets. This can be as simple as an arrow on the forehead and a notation 'CSF otorrrhoea' to ensure the receiving facility is aware of the existence of a basal skull fracture!

It is advised that contemporaneous notes are completed immediately after the incident. These may be performed using standard clinical software for existing patients or in paper form for new patients or unknowns. Records should be kept and there is scope to share records with local ambulance for audit purposes. A minimum data set should attempt to include :

- date and time of call out
- time of arrival on scene
- patient demographics (name, age, address)
- whether driver or passenger
- relevant past medical history, allergies
- clinical synopsis, use ISBAR format
- procedures performed on scene
- time departed scene

Examples of clinical record forms from the South Australian RERN scheme are included in Appendix One.

The value of clinical audit has been described before. Whilst the clinical record may be useful for audit, a designated post-mission audit from may allow a more nuanced deconstruction of what worked well and what was difficult. An example is shown in Appendix Two. A suggested approach is to consider factors impacting on self, on the team, in regard to the environment, patient considerations and finally overall systems - the STEPS approach.

Many debriefing techniques are available. Perhaps the gold standard is 'advocacy with enquiry'. Alternatively a rapid plus/delta debrief may be suitable "What worked well? What would you change?" - this can be applied using the Zero Point Survey or STEPS structure (self-team-environment-patient-system)

The prehospital environment may expose the rural clinician to situations and circumstances that can be extremely challenging. Discussions after an incident give team members an opportunity to review issues, and gain insight into the overall 'big picture' (task focus may lead to loss of situational awareness). Debrief offers an opportunity to critically review performance, with the aim of driving incremental improvement subsequently. The STEPS model (self-team-environment-system) is useful.

Debrief is also an opportunity to acknowledge emotions - whether these be fear (that the vehicle was unsecured), frustration (that there extrication took a long time), pleasure (that the team worked well), anger (that the message on speed and drink-driving was unheeded) etc.

Post-traumatic stress disorder is common amongst emergency healthcare workers and a real risk. Knowing the signs and symptoms and knowing how to seek help is essential.

Supporting and having the support of other emergency service providers is invaluable. The rural clinician is well-placed to support rural emergency responders from ambulance, SES, CFS, Parks and police....as well as to normalise discussions around self-care and cumulative trauma from such work.

Relationships developed through interdisciplinary sim (train as you mean to fight) can enhance performance and resilience on the prehospital scene (performance under pressure) and facilitate useful constructive debrief & reflection (incremental improvement, mitigate hazards).

The Sandpiper clinician has an opportunity to lead in this area - as well as to actively role-model vulnerability in regard to the impact of prehospital care on the psyche.

Again we encourage rural clinicians wishing to contribute to prehospital care in their community to be active leaders, driving multidisciplinary training and advocacy in this space. Immersive simulation can foster resilience in the face of challenging cases.

"Train as you mean to fight"

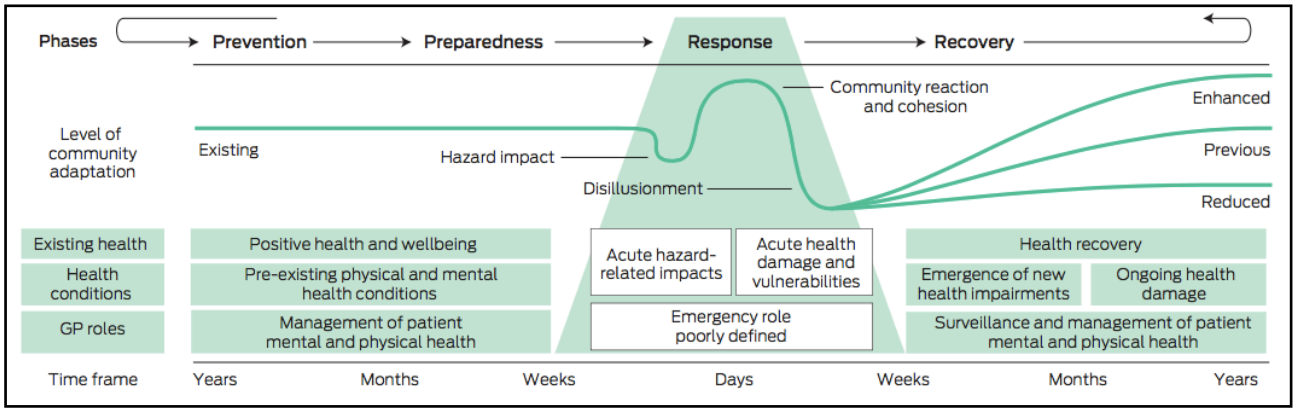
2.7 Community resilience

It should be apparent that a mass casualty incident in a small rural community can rapidly deplete clinical resources. A single ambulance may be sufficient for a small town needs, but is woefully inadequate with multiple casualties.

Additional community resilience may be harnessed via relationships with community groups. The Country Women's Association, Lions or Red Cross may be well placed to provide emergency catering. Schools, sports clubs and other facilities may be able to provide shelter from the elements and bedding. First aiders may be able to assist with management of urgent or delayed priority casualties. School buses or works vehicles may be harnessed to move casualties. A list of key contact personnel may be useful. Knowing organisational capacity and capability before an incident is vital.

It is recommended that Sandpiper clinicians become take a leadership role in their community, promoting engagement in disaster preparedness. The Sandpiper clinician may be well-placed to develop local community resilience models, performing hypothetical exercises to explore community resources and some of the unanticipated logistical barriers that may exist.

On a State or National level, the network of Sandpiper clinicians may add an increased level of preparedness for natural or manmade disaster, with a ready-made network of clinical and leadership expertise embedded in the rural community.



From Burns et al (2015) Where are general practitioners when disaster strikes?

Moreover the Sandpiper clinician is likely to continue to care for the needs of the community long after the incident has passed.

One of the strengths of primary care is the longitudinal relationship with patients, families and community developed over time. As well as providing 'cradle to grave' primary care, we may be able to provide 'roadside-to-rehab' care for critical illness in the rural context.

As such we believe the Sandpiper model to be integral to the care of rural communities, a position supported by the AMA, RDAA and ACRRM. Whilst the focus of the Sandpiper model is to enhance the on scene management of prehospital emergencies, there is ample opportunity for rural clinicians to become involved in injury prevention and education in their communities.

3. Standard Operating Procedures

We recognise that Sandpiper clinicians will often have extensive experience in delivering hospital or clinic based care to their community. Moreover many clinicians will have gained familiarity and competence in performing clinical assessment and interventions, both via taught courses, facilitated workshops and accrued time in practice.

The following pages outline the rationale for a limited suite of defined interventions expected of Sandpiper clinicians, with a suggested 'bold face' for key interventions.

These interventions include :

- initial assessment and SITREP
- haemorrhage control
- splinting
- IV & IO access
- analgesia
- needle and finger thoracostomy
- basic and advanced airway
- recognition & specific management of traumatic cardiac arrest

Competency in these procedures will typically be assessed on Sandpiper training courses and require successful sign off as a requirement for possession of a Sandpiper Bag.

Responsibility for clinical decisions, actions and execution of procedures remains with the individual clinician as defined by their scope of practice

We highly recommend thorough reading of recommended prehospital texts, as well as engaging in joint training with local prehospital services to understand their procedures and protocols, affording a better understanding of specific circumstances where the rural clinician can value-add and not detract from on-scene care.

Recommended texts :

Cases in Pre-hospital and Retrieval Medicine Ellis D & Hooper M (2010) Churchill Livingstone

Oxford Handbook of Pre-Hospital Care, Eds. Greaves I & Porter K (2007) Oxford University Press

Safety at scene Calland, V (2000) Mosby.

3.1 Initial assessment

Many of the 'alphabet' courses in emergency medicine teach a stepwise ABCDE approach to patient assessment. This mnemonic is easily recalled under pressure and serves to not only identify life-threatening injuries but also be a useful system for recap after interventions and when unsure of next step.

A	Airway with cervical spine control
B	Breathing
C	Circulation
D	Disability
E	Exposure

A criticism of the ABCDE approach is that rescuers are often taught not to proceed to the next step until the preceding step has been assessed and managed. This can be a problem in major trauma, where competing life-threats are present simultaneously. Problems unearthed in both simulation and real-life situations with this linear approach include divergent plans amongst team members (each task-focussed on their own component of the ABCDE algorithm), or the fact that patients can bleed out from major haemorrhage (C, circulation problem) whilst setting up for RSI (A, airway)

Within the context of prehospital trauma, the MARCH algorithm may be more appropriate - this prioritises control of massive blood loss from immediately compressible haemorrhage ahead of airway, respiration, circulation and head injury threats.

M	Massive external haemorrhage
A	Airway management
R	Respiratory management
C	Circulatory management
H	Head trauma and other injuries

Initial assessment may be compromised when a patient is entrapped and requires extrication. In the early stages assessment and intervention may be limited to

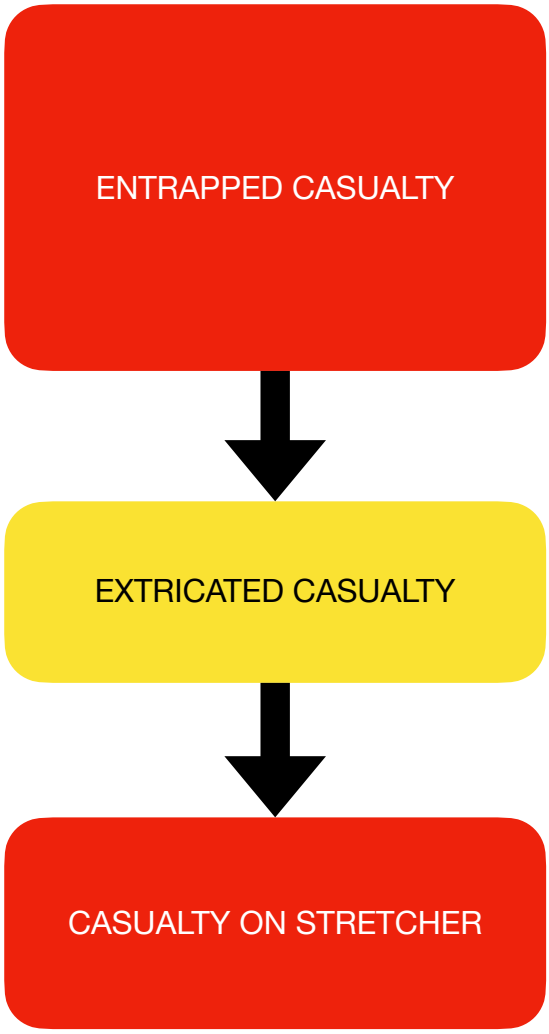
- control of massive haemorrhage by direct pressure,
- confirming airway patency and use of jaw thrust or placement of adjuncts,
- aiding respiration via supplemental oxygen, needle decompression and analgesia,
- placement of IO within the humeral head
- assessment of GCS or AVPU scores and preparation for neuroprotective measures
- supporting fractures, minimising movement and preparation for packaging

Maintaining verbal contact with the patient is vital - both for patient reassurance & anxiolysis, as well as to determine injury severity (decreased mentation from bleeding, hypoxia, evolving head injury).

A series of useful questions to ask includes

"Can you hear me?"
"Where does it hurt?"
"Where ELSE does it hurt?"
"Does your breathing feel normal?"

The MARCH assessment should be repeated as rescue progresses Initial assessment in the entrapped patient may be limited, but should guide the momentum of subsequent extrication. Clearly the patient with immediate needs (peri-arrest) may require rapid extrication vs controlled.



Initial Assessment of the entrapped patient may be limited to identification of catastrophic bleeding, determining airway patency, identifying flat or tension pneumothorax, broken bones and potential head injury.

These patient factors may guide the urgency of extrication. Interventions may be limited during the casualty release phase, but prepare set up for further management once extricated.

Casualties should be extricated (in-line where possible) onto a stretcher at half-height, with vac mat, pelvic binder ready. Clothing is removed, limbs splinted to anatomical alignment and preparation for meaningful interventions made.

A rapid MARCH assessment should be completed and an AMPLE history taken. All physiological monitoring, upgrade of IV access and delivery of meaningful interventions can now occur with stretcher at rear of ambulance, ready to egress the scene without hinderance.

Massive haemorrhage (also known as catastrophic compressible haemorrhage)

Massive haemorrhage refers to a major bleed that is rapidly life-threatening (such as a transected femoral artery or amputation). Spurting arterial bleeds, blood soaked clothing or pools of blood clotting not he floor should prompt a rapid assessment and immediate treatment before and other casualty assessment takes place.

The UK ATACC Faculty recommend the DDIT method should be implemented within a few seconds to control massive haemorrhage and allow the responder to rapidly move to the next step. Importantly, pressure needs to be applied to visible wounds using firm pressure. Pitfalls include covering bleeding points with dressings or failure to apply concentrated pressure.

The DDIT approach - total of all stages should occur in < 1 minute

D- Direct Pressure — Expose the source of bleeding and apply firm direct pressure at the site immediately, using fingerpoint pressure and a folded gauze or haemostatic dressing. On occasions visible arterial bleeding can be clamped. Resist the pitfall of applying multiple layers of dressings which fail to apply focal pressure and obscure the wound.

D- Direct Pressure — If bleeding does not stop and soaks through the dressing then apply another dressing with pressure directly on top of that point. Make sure that the pressure is well directed & focussed but avoid repeated removal of the dressing to 'have a look'

I- Indirect pressure	Applying pressure to the artery proximal to the bleeding point; this can be applied with a fist/knee to the femoral or axillary arteries, or even direct aortic compression (fist /knee in epigastrium
T- Tourniquet	Apply above the site of massive haemorrhage. Tighten until bleeding stops. Be aware that if done properly, this WILL cause extreme pain in the conscious casualty but will effectively stop major life threatening bleeds. A second tourniquet can be applied if bleeding is not controlled.

Airway

Airway compromise is a potential cause of preventable death. Deprivation of alveolar oxygenation will compromise organ function and can lead to death in minutes.

The airway is normally open and patent in a conscious patient. If the patient is unresponsive, or only responding to painful simul, then their airway is at risk and they should, be considered time critical. The ability to talk normally immediately provides information that the airway is clear. Being able to speak to a casualty - even if entrapped under wreckage - is a useful assessment. Complete or partial obstruction will compromise oxygenation and obstruction should be cleared as soon as possible. Supplemental oxygen may be required and fogging of the mask can give a quick assessment of respiratory rate. In some circumstances (eg presence of an intensive care paramedic with appropriate equipment), ETCO2 monitoring may be useful to assess respiratory rate and adequacy.

Potential for airway compromise may exist with burns, soiling of the airway, foreign bodies or decreasing conscious state (eg evolving head injury or uncontrolled bleeding causing hypovolaemia).

If there are no signs of life, then the traumatic cardiac arrest protocol may be initiated (mindful that traumatic cardiac arrest is NOT the same as a medical cardiac arrest).

Respiratory

During the MARCH assessment, the goal is to identify time critical injuries. A full head-to-toe examination can be delayed until the secondary survey. Initial MARCH assessment or respiratory function should include respiratory rate, SpO2, perception of difficulty in breathing ("Does your breathing feel normal?") and obvious signs of major thoracic trauma (flail, haemo/pneumothorax or tension pneumothorax).

Inability to complete full sentences, stridor, presence of wheezing or bubbling sounds, paradoxical chest wall movement, chest asymmetry, tachypnoea are harbingers of serious chest injury and should be throughly assessed and treated.

If there are no signs of life, then the traumatic cardiac arrest protocol may be initiated (mindful that traumatic cardiac arrest is NOT the same as a medical cardiac arrest).

Circulation

In traumatic injury the mantra should be to 'find the bleeding, stop the bleeding'. Some sources of blood loss are immediately obvious - the transected vessel, the amputated limb, the severe incisional wound. Think 'blood on the floor and four places more'. Consider the possibility of blood loss into/from head, thorax, abdomen/pelvis, & long bones. Direct pressure should be applied to obvious bleeding points, or haemostasis obtained by other measures (clamping of vessels, haemostatic dressings, use of staples or sutures, splinting, bandaging and loading with tranexamic acid).

In the context of trauma, assume signs of hypoperfusion (agitation, pallor, raised respiratory rate, tachycardia, low blood pressure) to be due to hypovolaemic shock from blood loss in the first instance.

The 'lethal triad' in trauma includes acidosis, hypothermia and coagulopathy. Whilst restoration of tissue perfusion may be the goal of administering fluids to maintain 'normal blood pressure', there are risks to this.

Overzealous fluid resuscitation with crystalloid can 'pop the clot' by increasing intraluminal pressure in blood vessels, causing venous ooze (especially pelvis or mesentery), as well as diluting clotting factors and causing hypothermia. Attempts at cannulation may delay extrication.

Ask 'Is fluid really necessary?' It is often more appropriate to aim for a mean arterial pressure (MAP) of 70-90 in the trauma patient, by administering 250ml aliquots of fluid & reassessing response (radial pulse, mentation). This is so-called 'permissive hypotension'. A higher MAP is required if head or spinal hypoperfusion present.

Focus on the basics - keep patient warm, maximise oxygen delivery & be cautious with overzealous fluid administration!

Saline DOES NOT carry oxygen
Cannulation and fluid resuscitation DOES NOT stop bleeding

"PRESERVE, DON'T REPLACE"

In addition to caution with crystalloid, be particularly cautious of 'popping the clot' during phases such as extrication, log-rolling and transfer to/from stretcher etc.

Preservation of volume, not replacement, minimal handling & use of splinting are all essential parts of haemorrhage control. Reduction of sympathetic responses by early and appropriate use of analgesia can also reduce bleeding.

Discussion of intraosseous access, upgrading of IV using a rapid-infuser catheter, use of the Israeli Emergency (or OLAES) bandage, splinting techniques, tranexamic acid and tourniquet use in the context of major haemorrhage are discussed in the Standard Operating Procedures section.

Occult blood loss (remember 'blood on the floor - and four places more') should be actively considered and anticipated. This may be impossible to confirm without access to ultrasonography (eFAST) or radiology (X-ray, CT). Ascertaining the mechanism of injury will give vital clues - for example, someone who has fallen from a horse and been kicked and trampled is at high risk of haemorrhage into skull, chest, abdomen, pelvis, long bones etc. Someone stabbed in the chest is at risk of haemo-/pneumothorax, tamponade, penetrating injury to vessels, nerves or other organs.

For non-compressible haemorrhage, early transport to a centre with surgical capabilities is essential to 'find the bleeding, stop the bleeding'. Ideally this should be a designated major trauma centre, but on rare occasions damage-control surgery may be achieved using local facilities. Certainly many rural hospitals have access to O negative blood and on occasions the patient may be transported their for transfusion pending retrieval...or even blood brought to the scene from a nearby rural hospital if circumstances, availability of personnel and policy allows.

If there are no signs of life, then the traumatic cardiac arrest protocol may be initiated (mindful that traumatic cardiac arrest is NOT the same as a medical cardiac arrest).

Head, spinal or other injuries

Certainly conditions such as hypoxia, hypoperfusion and intoxication can cause altered mentation. However the possibility of an emerging head injury should be actively sought and continually reassessed.

On rare occasions roadside rapid sequence induction of anaesthesia may be required for neuroprotective purposes (as well as for airway protection, humanitarian reasons, for anticipated clinical course etc). This should only be considered by clinicians confident with RSI of the critically ill and with means to perform safely and monitor appropriately.

It is more likely that the head injured patient will require simple interventions - chin lift, supplemental oxygen, placement of adjuncts. A phenomenon of 'impact brain apnoea' has been described and may be witnessed if arriving on scene within seconds to minutes of an incident. This will respond to simple measures.
An evolving head injury (decline in GCS or AVPU score) or a signifiant head injury (eg posturing, loss of protective airway reflexes) will mandate early moves to secure the airway and maximise oxygenation, normalise ETCO2 and maintain cerebral perfusion.

The prehospital RSI (use of induction agent and neuromuscular blockade) is a tightly-coupled high stakes procedure, with risks of hypotension, hypoxia, regurgitation as well as physiological, anatomical and situational difficulty.

As such RSI of the critically ill should ideally be performed only by experienced clinicians using appropriate medications techniques and monitoring equipment, preferably working to a standardised SOP. For the inexperienced, there is more gain on maximising oxygenation, temperature control and perfusion - in short, doing the basics, well.

Any traumatic injury implies a high index of suspicion for spinal injury and attempts should be made to minimise potential disruption. This may include :

- protection of cervical spine (patient can self protect, use of soft collar use of semi-rigid collar, vacuum mattress, rolled towels etc)

- protection of spinal column (use of scoop mattress to extricate from the ground, extricate in-line unless imminent threat, minimise log-rolling, early placement onto a vacuum mattress)

- awareness of the hazards of rigid 'spinal boards' (use of these should be limited to the extrication phase only, as a bridge from vehicle to stretcher)

- awareness of the danger of pressure area necrosis from prolonged periods in a semi-rigid collar

- appreciating the difference between an awake patient who can self-protect their cervical spine, a combative or intoxicated patient who may be at risk of injury unless control is exerted (use of language, early analgesia or occasionally sedation) and the unconscious patient who cannot self-protect (the he'd of an intubated patient has an alarming tendency to 'loll' in transit eg cornering - immobilisation in a vac mat with roles towels can minimise this)

Other bony injuries pose potential danger - limbs should be splinted to anatomical alignment (requiring analgesia unless severely obtunded) and splints always applied to skin. Simple SAM splints are lightweight and can be moulded to provide effective splintage in a few seconds. They also provide contours and rigidity for the side-walls of prehospital packs! Specialised devices such as pelvic binders and femoral traction splints should also be applied if pelvic or femoral injuries are suspected.

Anticipate these injuries and ensure a progression - early use of splinting can facilitate extrication and minimise pin; pelvic binders, femoral traction splints and vacuum mattresses should be prepared ready to receive the patient immediately after extrication.

Whilst we routinely splint to skin, be conscious of the need for thermal protection - move the patient to shade and off the hot tarmac, protect from rain or sleet, use a reflective blanket to minimise heat loss, switch on coolers/heaters in the ambulance and give pre-notification to the receiving facility etc.

Initial Assessment SITREP

This has been covered in earlier sections, but to refresh :

- SITREP early & often
- use standardised format eg ISBAR, AT-MIST-AMBO or METHANE (mass incident)
- remembers ABC : Accuracy, Brevity & Clarity

Utilise available and offical communication channels; this may be best delegated to the ambulance personnel on scene.

Sharing of mental model and frequent pauses to 'summarise & share' are worthwhile investments despite situational urgency on scene, as they can alleviate significant downstream delays.

Summary features of Initial Assessment

- ensure scene safety
- role assignment
- MARCH assessment
  - Massive haemorrhage
  - Airway
  - Respiration
  - Circulation
  - Head, spinal & other injuries
- ask "*where does it hurt? where else does it hurt? does your breathing feel normal?*"
- remember findings on initial assessment will guide urgency of extrication
- maintain clinical momentum, avoid inertia
- think "*where are we? where do we need to be?*" ie anticipate the clinical course
- remember to provide an early SITREP
- find the bleeding, stop the bleeding
- don't 'pop the clot' via overzealous administration of IV fluids or movement
- prepare pelvic binder on vac mat
- splint to skin, splint to anatomical alignment, keep warm
- extricate and package simultaneously
- early interventions are often limited to doing the basics, but doing them well

3.2 Practical procedures - MARCH

The following pages summaries practical procedures (value-adding, meaningful interventions) that the Sandpiper Clinician may be able to offer on scene.

M direct pressure
tourniquet
splint to anatomical alignment, splint to skin
keep warm
early administration of TXA

A basic airway manoeuvres & adjuncts
second generation supraglottic device (laryngeal mask airway)
emergency surgical airway

R chest decompression via needle or finger thoracostomy
analgesia

C IV access, IO access, upgrade access

H neuro- and spinal protection, wound closure, analgesia etc

3.2.1 Massive haemorrhage control

The adult human body has only 5000 ml of circulating blood volume. A transected vessel can cause catastrophic haemorrhage, which may be concealed (head, chest, abdo/pelvis, long bones) or revealed. The emphasis should be on rapid identification and control 'find the bleeding, stop the bleeding'.

Key skills

- DDIT pressure
- early administration of tranexamic acid
- use of an Israeli 'Emergency' bandage (or equivalent eg OLAES)
- use of direct & indirect pressure techniques
- use of a tourniquet

Remember that minimal patient handling (use scoop stretcher & vac mat, minimise log roll, splint to skin is considered part of haemorrhage control) - splinting is described in a separate section.

Avoid 'popping the clot' through aggressive administration of IV fluids. Keeping patients warm will reduce impact of the 'lethal triad'.

If bleeding is concealed, early surgical consultation (preferably in a major transport centre) is required. The required fluid on scene is DIESEL...transport the patient ASAP.

If haemorrhage is revealed, adopt the DDIT approach

HAEMORRHAGE CONTROL - DDIT ALGORITHM

D- Direct Pressure	Expose the source of bleeding and apply firm direct pressure at the site immediately, using fingerpoint pressure and a folded gauze or haemostatic dressing. On occasions visible arterial bleeding can be clamped. Resist the pitfall of applying multiple layers of dressings which fail to apply focal pressure and obscure the wound.
D- Direct Pressure	If bleeding does not stop and soaks through the dressing then apply another dressing with pressure directly on top of that point. Make sure that the pressure is well directed & focussed but avoid repeated removal of the dressing to 'have a look'
I- Indirect pressure	Applying pressure to the artery proximal to the bleeding point; this can be applied with a fist/knee to the femoral or axillary arteries, or even direct aortic compression (fist /knee in epigastrium
T- Tourniquet	Apply above the site of massive haemorrhage. Tighten until bleeding stops. Be aware that if done properly, this WILL cause extreme pain in the conscious casualty but will effectively stop major life threatening bleeds. A second tourniquet can be applied if bleeding is not controlled.
	(total of all stages should occur in < 1 minute)

HAEMORRHAGE CONTROL - TRANEXAMIC ACID

Tranexamic acid (TXA) is an anti-fibrinolytic agent with many uses in preventing haemorrhage that rose to prominence following the CRASH-2 study showing a mortality benefit in trauma patients. TXA interferes with the normal fibrinolysis process. As such it may reduce ongoing haemorrhage from multiple 'oozing' bleeding points eg : venous plexus in pelvic injury, mesenteric ooze in intra-abdominal injury. It is available as a clear, colourless solution, 1000mg in 10ml

INDICATIONS

Use of TXA in the context of trauma includes :

IV load of 1g (20mg/kg) over 10 minutes in the first three hours post-trauma, followed by a further 1g over 8hrs IV

It can also be used as a haemostatic addition to e.g.: dressings or to tamponade devices such as epistat or rapid-rhino in epistaxis. Soak the gauze or device in TXA and then use as normal.

CAUTIONS

A rapid bolus of TXA can cause transient hypotension - thus it is important to administer slowly in the trauma patient - typically over 3-5 minutes

HAEMORRHAGE CONTROL - Israeli 'EMERGENCY' bandage or equivalent

The Emergency Bandage or Israeli bandage is a specially designed, first-aid device that is used to stop bleeding from haemorrhagic wounds caused by traumatic injuries in pre-hospital emergency situation.

The bandage has a built-in non-occlusive pad designed to be applied to the wound. A pressure bar allows the bandage to be wound in place, then the direction reversed through the bar and direct pressure applied to the wound. A simple closure bar allows the device to be secured one-handed.

Alternatives such as the OLAES modular bandage include a clear plastic pressure cup, allowing visual inspection, more focussed wound pressure and doubles-up as an eye protector. A sterile sheet is also included in the packaging for eg burns and occluding chest injuries.

Israeli 'Emergency' Bandage (left) and OLAES Modular bandage (right)

INDICATIONS

Traumatic wounds requiring haemostasis

CAUTIONS

None, other than lack of training or familiarity with device

RESOURCES

See the following video for specific advice on how to apply the Israeli bandage
https://youtu.be/S2_EU1T-o-g

Queensland Ambulance Service protocol for the Emergency Bandage is as below
https://www.ambulance.qld.gov.au/docs/clinical/cpp/CPP_EmergencyBandage.pdf

HAEMORRHAGE CONTROL - DIRECT and INDIRECT PRESSURE techniques

Direct pressure may be obtained using gauze (+/- TXA) and finger tip or palm pressure over the wound in first instance. Alternatively identified bleeding vessels can be clamped.

Failing that, further direct pressure may be added to the wound site eg : Israeli 'Emergency' or OLAES bandage.

Alternatively bleeding vessels can be directly oversewn e.g.: scalp lacerations - use of a large silk suture can rapidly achieve haemostasis, as can staples.

Indirect pressure may be achieved by compression of compressible vessels e.g.: a fist or knee in the femoral triangle for lower leg wounds, pressure over the brachial artery for upper limb wounds. On occasions a fist or even knee in the epigastrium can cause aortic compression and reduce catastrophic bleeding until other measures are instituted.

As well as applying pressure downward, we recommend twisting the pressure point sideways - this not only compresses vessels it also 'kinks' them and can aid slow flow.

Embedded objects e.g.: knives, tree branches, metallic spikes or debris should be left in situ and padding applied around them to minimise movement. They may need cutting for transport.

Truncal and penetrating wounds eg neck may be difficult. There are reports of effective haemostats being achieved with placement of a Foley catheter balloon, which is placed into the wound, then inflated and withdraw - effectively balloon tamponade.

INDICATIONS

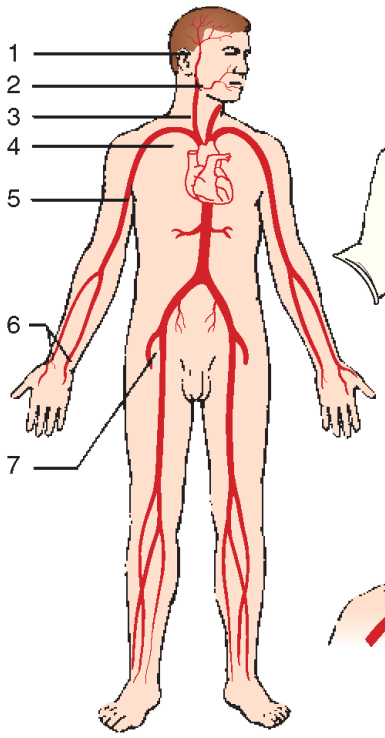
Traumatic wounds requiring haemostasis where direct methods have failed.

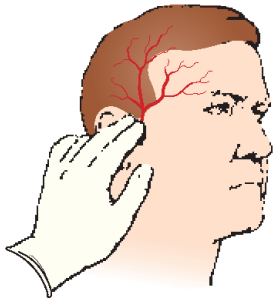
CAUTIONS

Pain on wound site, inability of patient to tolerate pressure

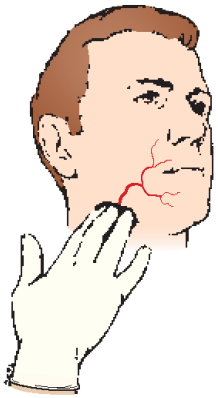
RESOURCES

Australian Resuscitation Advisory Network - Bleeding Management guideline
http://www.aran.org.au/uploads/3/8/9/1/38917405/trauma_-aran_guideline_6_-_bleeding_management_2016.pdf

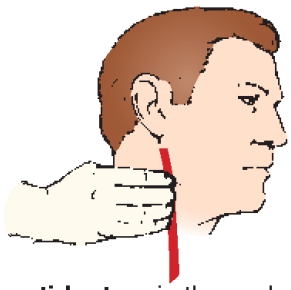




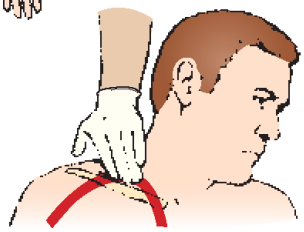
1. **Temporal artery**, in front of the ear



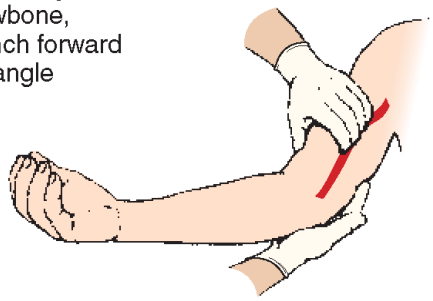
2. **Facial artery**, on the jawbone, about 1 inch forward from the angle of the jaw



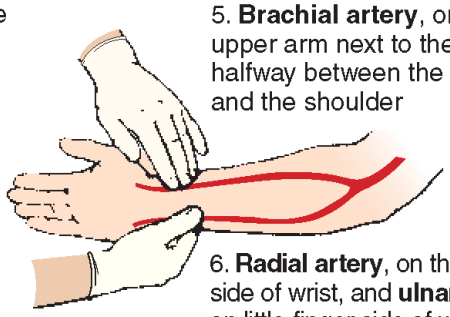
3. **Carotid artery** in the neck, located beside the trachea (of questionable value for bleeding control, but may be used in an extreme emergency).*



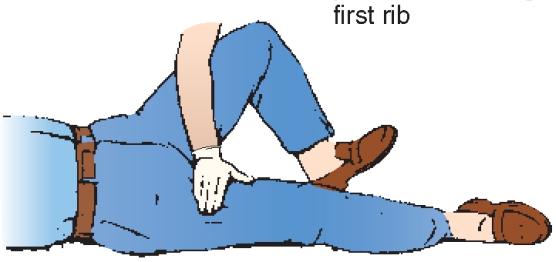
4. **Subclavian artery**, just behind the inner end of the collar bone (clavicle), exerting pressure down against the first rib



5. **Brachial artery**, on the upper arm next to the body, halfway between the elbow and the shoulder



6. **Radial artery**, on the thumb side of wrist, and **ulnar artery**, on little-finger side of wrist



7. **Femoral artery**, midway in the groin, where the artery passes over the pelvic bone

*__Note__: Do *not* apply pressure to both sides of the neck at the same time. This would cut off the blood supply to the brain.

HAEMORRHAGE CONTROL - use of a TOURNIQUET

If direct and indirect methods of haemorrhage control fail to achieve haemostasis, then a dedicated haemorrhage control tourniquet should be applied.
Application of tourniquet :

- Tourniquet should be applied as close as possible proximal to the site of bleeding avoiding bony prominences
- Tighten tourniquet until bleeding stops
- Time of tourniquet application must be recorded
- Application of the tourniquet must be clearly handed over at the receiving facility
- Tourniquet is single use and should be left on the patient until surgical control of the haemorrhage can be safely attempted
- If tourniquet is likely to be on for >2 hours, consult with receiving facility and/or retrieval service

INDICATIONS

Traumatic wounds requiring haemostasis, where both direct and indirect measures have failed

CAUTIONS

Pain on wound site, inability of patient to tolerate pressure, prolonged tourniquet time

RESOURCES

The use of a Tourniquet - Australian Resuscitation Council
https://resus.org.au/faq/the-use-of-a-tourniquet/

MARCH - Massive Haemorrhage Control

Remember **'FIND** the **BLEEDING, STOP** the **BLEEDING'**

Think DDIT : direct pressure, direct pressure, indirect pressure, tourniquet

- this may include DIGITAL PRESSURE, CLAMPING VESSELS
- consider use of ISRAELI EMERGENCY BANDAGE or EQUIVALENT
- FIST or KNEE PRESSURE then 'TWIST' to COMPRESS/KINK major bleeds
- early USE OF TOURNIQUET for major bleeds / amputation etc
- consider use of staples, suture, clamps or even tissue glue
- penetrating wounds may require use of Foley catheter to tamponade

Always **DOCUMENT TOURNIQUET TIME**

Remember to **LOAD WITH TRANEXAMIC ACID 1g** over 10 mins in first three hours

SPLINT LIMBS & PELVIS to **ANATOMICAL ALIGNMENT**

SPLINT to **SKIN**

Keep patient **WARM**

Remember **CRYSTALLOID DOES NOT CARRY OXYGEN**

Beware of **'POPPING THE CLOT'** with crystalloid. Overzealous use can :

- dilute clotting factors
- worsen hypothermia
- increase bleeding especially from concealed venous ooze eg pelvis

If **BLOOD** is what they are **BLEEDING**, then **BLOOD** is what they are **NEEDING !**

If there is **CONCEALED** haemorrhage, early **SURGICAL INTERVENTION** is required

The **BEST RESUSCITATION FLUID** may be **DIESEL** (or Av Gas !)

3.2.2 Airway

A patent airway is required for maintenance of alveolar oxygenation and avoidance of hypoxia, acidosis and neurological injury or death.

Airway patency may be compromised by loss of protective airway reflexes due to head injury or low-flow states (cerebral hypoperfusion from hypovolaemia), with additional threats to patency from regurgitated stomach contents and/or airway soiling from maxillofacial or other bleeding.

Threats to airway patency and protection should be rapidly identified in the initial MARCH assessment and remedied.

A high number of prehospital deaths from trauma occur with injuries that are potentially survivable, yet first aid intervention is infrequent. The phenomenon of 'impact brain apnoea' has been described, whereby significant head trauma can cause a temporary cessation of respiration (apnoea) with concomitant hypoxia, hypercapnia and loss or airway protection.

Thus there is a potential window of opportunity for simple first aid manoeuvres to save lives, particularly in the context of head injury and airway compromise. This can be provided by impromptu (bystander) responders, by immediate responders (CFS, SES, Parks, Police etc) or by trained responders (ambulance, Sandpiper etc.)

Simple interventions such as jaw thrust and early placement of airway adjuncts, with supplemental oxygen are vital.

Key skills of Sandpiper Clinician include

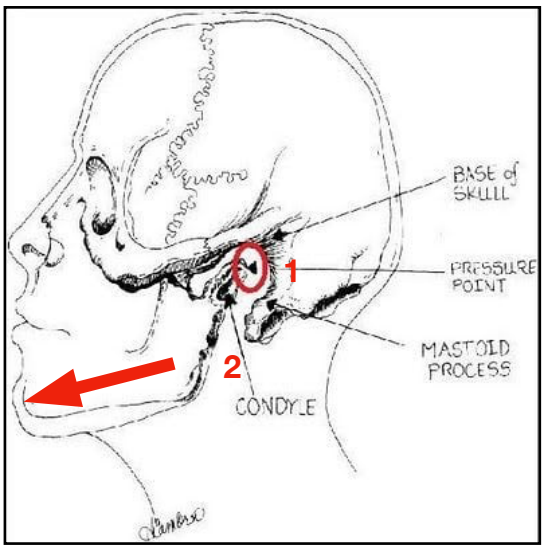
- Basic airway manoeuvres
- Effective bag-valve mask ventilation
- Airway decontamination
- Use of second generation supraglottic device
- Surgical airway
  (intubation - with caveats)

BASIC MANOEUVRES

Jaw thrust

This aims to displace the tongue anteriorly and alleviate airway obstruction. Sadly jaw thrust is often poorly taught, recalled and applied in a crisis. We recommend the identification of Larson's point (also down as the 'laryngospasm notch') to initially assess the airway.

Firm pressure in the area just below the external auditory meatus may provoke a reaction from the seemingly obtunded patient, alleviating hypopnea or apnoea (1). It is a very effective painful stimulus! Moreover pressure at Larson's point will encourage the rescuer to perform a visual inspection of the oropharynx, assess adequacy of ventilation and deliver cervical spine immobilisation. If there is no response to pressure, the rescuer slides fingers anteriorly 2cm into the groove of the mandibular ramus to apply firm anterior jaw thrust (2).



Care should be taken to apply maximum force - use knees, legs, body weight to assist jaw thrust, in preference to the forearms (which fatigue easily). Use of adjuncts can free up hands.

Adjuncts

These include naso- and oropharyngeal devices. Use of these is taught on most basic airway courses and will not be recapped in detail here. Suffice it to say that the early use of naso- and oropharyngeal airways can allow an effective conduit to oxygenation for an obtunded patient at risk of airway obstruction.

Practice is best performed on mannikins and/or in the controlled environment of an operating theatre elective list.

The Sandpiper clinician needs to be capable and competent to size and place these devices.

Bag mask ventilation

Again BMV is an essential skill which is often taught at an early stage in the medical career. Sadly it is not always taught well. Specifically competence at BMV use in a standardised mannikin (eg ResusiAnne) does not necessarily translate to effective BMV in the prehospital setting. Patients may be combative, edentulous, bearded or have concomitant airway soiling.

Key factors for practice via task-training and simulation as part of Sandpiper training will include:

- airway decontamination techniques (soiling of the airway is present in approx 1/3rd of out-of-hospital cardiac arrest patients before EMS responders arrive) requiring use of positioning and suction prior to BMV,

- appropriate selection of BMV device and consideration of the apnoea vs the spontaneously ventilating patient (FiO2 delivery can differ markedly depending on device and presence/absence of a PEEP valve),

- effective techniques to make a seal (we suggest the two-handed vice-grip)

Variation exists in FiO2 delivery to spontaneously ventilating patients according to device

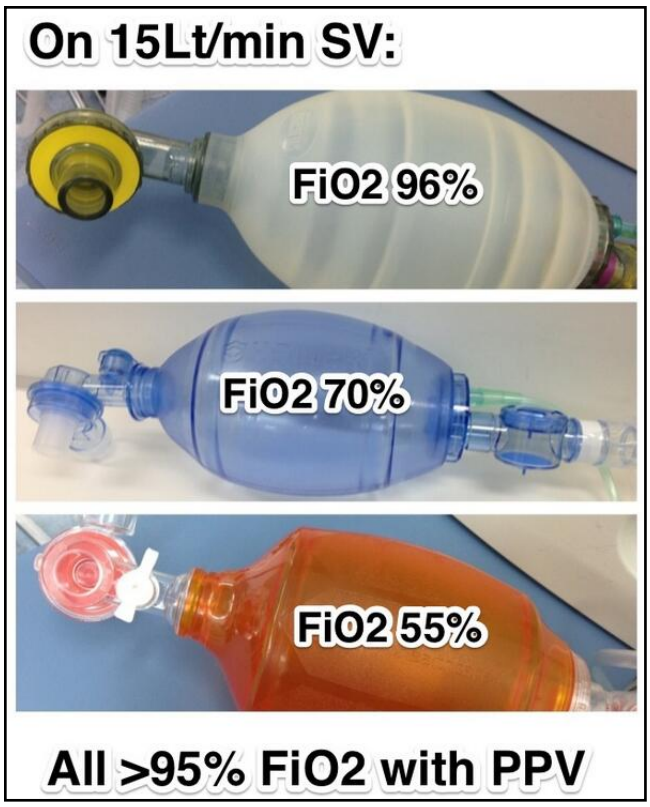
Laerdal	FiO2 0.96
Hsiner	FiO2 0.75
Mayo	FiO2 0.55

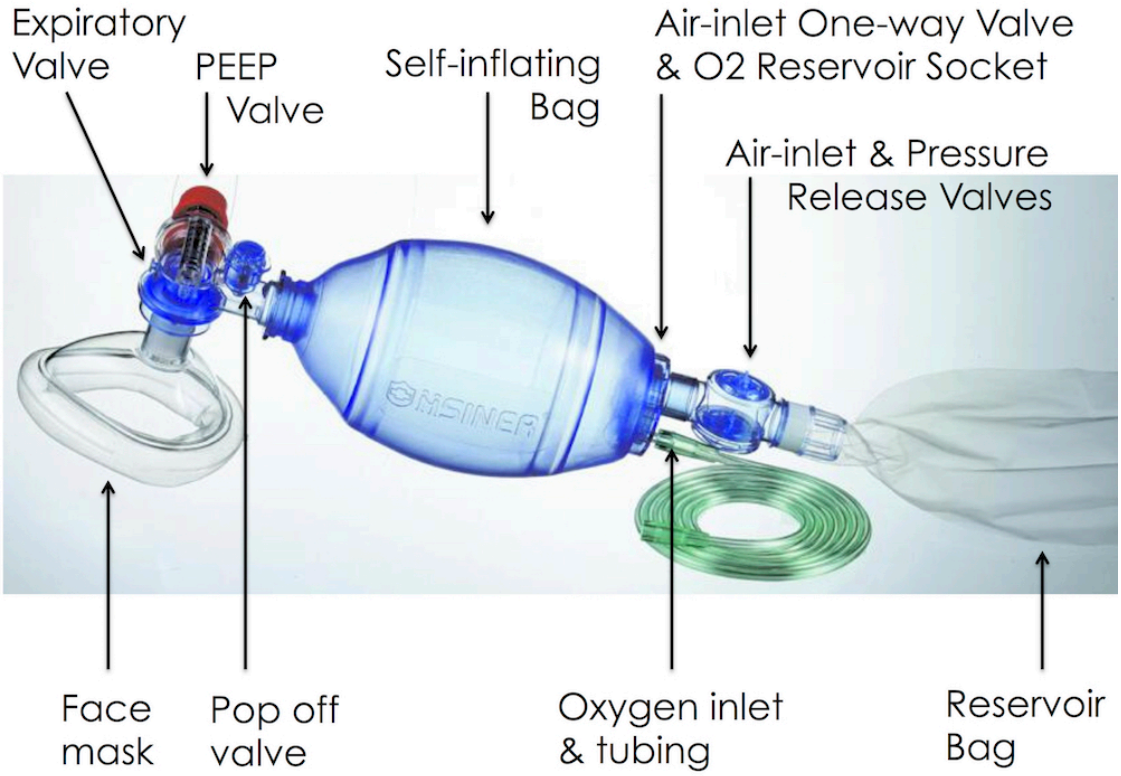
Sufficient negative inspiratory pressure is required to overcome the patient inspiratory valve, otherwise, air will be entrained instead of oxygen

Some duckbill valves are difficult to overcome when spontaneously breathing

Patients with reduced respiratory effort are particularly at risk

As a safeguard in spontaneously breathing patients it is useful to coordinate 'assist' positive pressure ventilation with the patient's spontaneous efforts to ensure that the patient inspiratory valve is opening





The 'vice grip' is a preferred two-handed technique to maximise efficiency of BMV in the apnoeic or severely obtunded patient

Note that it can be extremely challenging to achieve an effective seal in the emergency or prehospital setting.

For the patient with respiratory effort (spontaneous ventilation) and a patent airway (adjuncts placed) it may be more appropriate to free up available resources by using a non-rebreather mask at maximum flow rate. This can deliver an FiO2 in excess of 55%, which compares favourably to some bag-mask devices!

Decontamination (suction)

The airway may become soiled with blood, vomit or regurgitated stomach contents. The estimated LD_{50} of liquid stomach contents is 1ml/kg; that of particulate matter is only 0.5ml/kg. Sadly airway decontamination may be forgotten in haste to apply more advanced techniques.

Whilst airway patency and protection may be established be rescuers and hypoxia addressed, there is little point if the patient succumbs to aspiration pneumonitis some days later in the intensive care unit.

Recommended approaches to the soiled airway include :

Positioning

Rolling the obtunded patient on their side may allow fluids to be drained from the oropharynx (NB ideally spinal precautions should be observed; use available helpers and roll using command language "ready-brace-roll" with the person in charge of head and airway controlling the move.

Removal under direct vision

Evacuation of solid or semi-solid material using fingers, tongue depressor or Magill's forceps. Ideally any decontamination should be performed under direct vision; a laryngoscope is ideal to visualise the oropharynx & perform meticulous hygiene.

Suction

Use of a dedicated suction device (manual, battery or mains power). A variety of commercially available devices are available, including hand-held bulb aspirators, foot pumps and electrical suction. Electrical devices need regular charging and hard plastic canisters should be checked for leaks.

Use a bigger sucker

Whilst many ambulance services and emergency departments still use the standard Yankauer rigid suction device, remember that this was designed to remove saliva during elective anaesthesia or blood form the surgical field. It can easily become occluded and does not deal well with large volumes. Furthermore the device requires a small, nearly invisible, hole to be occluded to generate suction - which can be hard to apply in a crisis. Alternatives include disconnecting the Yankauer and using the suction hosing directly or use of a dedicated 'large bore' device such as the DuCanto sucker.

Drain the oesophagus

For massive contamination (eg GI bleed or bowel obstruction) then an orogastric tube may be placed early. A common prehospital technique for the obtunded patient is to place a 9.0mm endotracheal tube deliberately into the oesophagus, thus acting as a conduit for oesophageal losses

Remember that an ambulance is an excellent source of suction, oxygen, light and protection from the elements!

Hand-held suction unit - left is the Res-Q-Vac suction model. Pictured below is the Suction-Easy bulb device

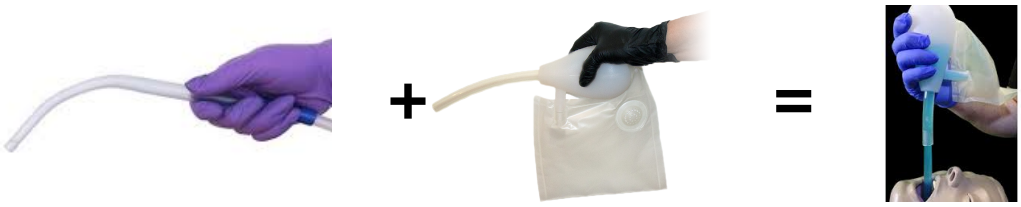
In general we advice against the use of electrical suction units for prehospital bags - they require frequent charging, are bulky and hard plastic canisters are easily damaged.

SSCOR suction unit - powered by both battery and 240V with large suction canister. Useful device but bulky and expensive

Laerdal compact suction unit (CSU) - powered by rechargeable batteries and hence at risk of running down. The hard plastic canisters often crack.

Foot-operated suction - very durable but can be hard to operate when performing suction on the ground (often have to use hand or delegate foot-pump operation to another person)

Electrical suction in ambulance or other transport platforms should be used if available. However for use 'in the field' a lightweight, disposable bulb-suction device may be sufficient eg DuCanto sucker with Suction-Easy unit



Combination of a wide-bore DuCanto sucker & handheld bulb Suction-Easy device allows effective airway decontamination without the need for power supply or risk of broken suction canister

3.2.3 Advanced airway

Securing airway patency and protection is an essential skill in caring for the multiply injured or severely ill patient. It maximises oxygenation, enables safe transport, facilitates neuroprotection as well as rapid in-hospital investigation and definitive care.

The extra time spent on scene securing an airway (even by skilled clinicians) is one of the greatest controversies in prehospital care. This time delay is normally offset by time saved during the transport and in-hospital phases of care, provided it is performed safely and expeditiously.

Options include :

- use of a second generation supraglottic airway
- placement of a cuffed endotracheal tube in the trachea
- performing an emergency surgical airway

The decision to use each of these techniques will depend largely on the training, available resources, clinical expediency and appropriateness for this patient and this clinician.

Taking even a spontaneously-ventilating yet severely obtunded patient, let alone a conscious but in pain patient, and deliberately induce anaesthesia, lose protective airway reflexes and risk profound hypotension and hypoxia should not be undertaken lightly. Moreover, even the skills of a clinician who is confident at intubation are rendered potentially dangerous if there is not access to anaesthetic induction agents, full physiological monitoring (including waveform capnography), post-intubation sedation/ paralysis, and trained assistance etc.

For the Sandpiper clinician with limited experience in managing critically ill airways, we advocate a 'do no harm' approach.

A strategy focussing on doing the basics - but doing them well - is likely to offer higher yield than attempting a procedure such rapid sequence induction (RSI) with which one is uncomfortable, poorly trained or where situational, anatomical or physiological difficulty make success unlikely.

In general, for the patient who is spontaneously ventilating, use of adjuncts, positioning , suction and O2 delivery by mask (bag-mask or non-rebreather mask) may be adequate.

If obtunded to the point of unresponsiveness, additional options for the 'occasionalist' airway operator as an alternative to drug-assisted RSI may include

- placement of a supraglottic airway
- placement of an ETT without drugs
- performing an emergency surgical airway

Be aware that placement of an ETT without drugs is really only feasible in patients who are obtunded to the point of loss of laryngeal reflexes and historically was only realistic for those patients in cardiac arrest. Evidence for favourable neurological outcomes in such patients is poor. For the arrested patient, we advice use of a second generation supraglottic device in preference, until ROSC achieved or resuscitation ceased.

For the patient with intact airway reflexes, they will need an RSI (use of induction agent and paralysing agent) - this should only be attempted by experienced clinicians with significant ongoing exposure to the critically ill airway - and ideally in conjunction with full physiological monitoring and means of maintaining anaesthesia and providing mechanical ventilation post RSI. We will thus focus on two initial techniques - placement of a supraglottic airway and performance of an emergency surgical airway - well within the skillset of most clinicians.

SUPRAGLOTTIC AIRWAY

Nowadays preference is given to so-called 'second generation' devices. Unlike the 'classic' LMA used in elective anaesthesia, second generation devices are characterised by inclusion of a gastric drainage port. Many devices will differ in shape (hyperangulated vs shallow), extra features (bite block, clear labelling), ability to act as a conduit for intubation (intubating laryngeal mask airway) and presence or absence of a cuff.

However all 'second generation' devices will allow gastric drainage and this is why they are recommended for the (mostly) unfasted patients encountered in prehospital settings,

There are many second-generation devices on the market in Australia. Each will have pros and cons for use in particular circumstances. Clearly what may be the optimal selection for the patient in the Operating Theatre by an anaesthetist may differ from the optimal selection for use in the unfasted patient in the prehospital environment by an 'occasionalist'.

Additional considerations, such as having a range from neonate, paediatric through to adult may be necessary, as may longevity in storage and overall pack size. Ideal qualities of a second generation device for prehospital use may include :

- easy identification of size, with a range from neonate, paediatric to large adult
- small pack size
- absence of an inflatable cuff (this step is commonly forgotten by 'occasionalists')
- presence of a large bore suction port or conduit for dedicated gastric drain
- easy insertion technique and reliable 'fit' within the hypo pharynx for most instances
- ability to place an endotracheal tube subsequently, allowing a 'staged airway'
- concordance in device availability and training with existing prehospital providers

iGel

The iGel fulfils many of these characteristics and is recommended as the preferred device currently by many prehospital services including ambulance and retrieval. It is available in sizes from neonate through to large adult. It is easily inserted (and may indeed replace the oropharyngeal as a rescue airway adjunct in the future). There is no cuff to inflate. Instead a thermopolymer mask conforms to typical airway anatomy, with subsequent moulding of the patient's pharynx to make a seal. It is a conduit for intubation. A gastric drainage port allows placement of an orogastric drain.

The technique of iGel insertion can be readily taught on mannikins and in selected patients in theatre and the ED.

It is important to remember to insert a gastric drain via the iGel (for other second generation device) to facilitate gastric drainage. Ideally these should be pre-packed in same pouch as the supraglottic airway.

A note on the PALM technique

The gold standard for airway management in the non-arrested trauma patient remains a cuffed endotracheal tube, ideally delivered by an experienced team using rapid sequence induction of anaesthesia and intubation of the trachea.

Some clinicians may have heard of the technique of PALM - Pharmacologically Assisted Laryngeal Mask insertion. This technique involves sedating the trauma patient and inserting a supraglottic airway device with the aim of improving their oxygenation and providing a degree of protection from ongoing airway contamination. This is a controversial practice.

PALM – What is it?

The PALM technique has been described in polytrauma patients with a reduced GCS and on-going airway obstruction as well as airway soiling from facial injuries. The patients are often entrapped. If basic airway manoeuvres and adjuncts are impossible or fail to maintain oxygenation, the patient's level of consciousness is reduced further pharmacologically, without the use of neuromuscular blockade. This allows insertion, and ongoing tolerance, of a supraglottic airway device with the option of assisting ventilation if this is required.

The Evidence Base

The evidence base for the technique is scant, with only a small series of case reports describing the technique. However the role of supraglottic airway devices in both in-hospital and pre-hospital use, both routine and difficult, is well established in obtunded patients.

The PALM procedure is a technique which can be considered in a patient with a severely compromised airway, when all routine measures have failed. In this situation, when all other simple airway manoeuvres and adjuncts have been exhausted, when it is not possible to deliver a pre-hospital RSI, and when the patient remains hypoxic, performing the PALM procedure is a potentially lifesaving option.

PALM is not to be considered an 'easy alternative' to a pre-hospital RSI. The procedure is located on the airway management ladder in a similar position to a surgical airway. Indeed a surgical airway is considered an alternative to the procedure and will be the rescue technique of choice if the PALM fails. The Royal College of Surgeons (Edinburgh) Faculty of Prehospital Care in the UK has issued a consensus statement on the PALM technique which explains the numerous caveats to this technique and the need for it to be restricted to appropriately trained personnel operating within a system of clinical governance.

At this stage no recommendations on choice of drug are made, although ketamine may be a sensible consideration. Use of a specific checklist and ETCO2 monitoring are considered essentials. It is hoped that, by generating an evidence base regarding this technique, future decisions regarding the PALM procedure's position in pre-hospital airway management can be more clearly defined.

Remember - the PALM technique is currently considered controversial.

Whilst the UK Faculty of Prehospital Care have issued a consensus statement on PALM, this was not supported by the Royal College of Anaesthesia UK.

EMERGENCY SURGICAL AIRWAY (ESA)

For many clinicians, the notion of performing an emergency surgical airway was seen as a terrifying procedure, usually coming at the end of a series of airway calamities resulting in 'failed airway' and the dreaded 'cannot intubate, cannot oxygenate' scenario.

Whilst CICO resulting in an emergency surgical airway (also known as 'front of neck access' or FONA) is a rare rescue event in elective anaesthesia, it may be more common in the prehospital or emergency setting.

"The technique of scalpel-finger-bougie-tube is easily taught and implemented"

We appreciate that the Sandpiper clinician with limited airway experience may be daunted by the options available to them. Whilst preference is to maintain an airway by 'doing the basics, well' (opening airway placing adjuncts, delivering oxygen) there are occasions when the situation may force an escalation in management.

Placement of a second-generation supraglottic device in the severely obtunded patient (this can be re-framed as no more complicated than passing an oropharyngeal airway), consideration of pharmacological-assisted laryngeal mask placement (PALM), may not be appropriate or fail - in which case the clinician must always be prepared to transition rapidly to the surgical airway.

Indeed in some circumstances, the surgical airway may be considered 'inevitable; (ie not a failure, but a natural progression through available techniques) or even adopted as a primary rescue technique (entrapment with no access to oropharynx)

Fortunately the technique of surgical airway can be easily learned, then regularly practiced and discussions around decision-making incorporated into scenario-baed task and simulation training.

Demystifying the surgical airway

The technique of surgical airway is relatively easy. The decision is often quoted as 'hard to make'. However if there has been due diligence in airway assessment, planning and preparation, then the transition to a surgical airway may be achieved as a low stress natural escalation performed in a controlled, timely manner...rather than a perception of failure, performed by stressed clinicians who have 'failed'.

Key to success is identification of the cricothyroid membrane and ready availability of equipment to access the trace via this infra-glottic approach.
You will need :

- practice in the laryngeal handshake
- an understanding that this technique is mostly tactile, not visual
- skin prep, a scalpel, a bougie, size 6.0 ETT, syringe for cuff inflation and means to secure the ETT and check placement (ideally waveform capnography, failing that colorimetric ETCO2 monitoring)

Remember - with training, the decision and technique is straightforward

Surgical airway - step by step guide

An open procedure performed to secure the airway via an incision in the cricothyroid membrane, aka emergency surgical airway (ESA). It is distinct from needle cricothyroidotomy (aka emergency cannula cricothyrotomy), which is an alternative approach to 'front of neck access' (FONA). In general the scalpel-finger-(bougie)-tube technique is preferred to needle cricithyroidotomy for adult patients.

"The Laryngeal handshake" - Adapted from Levitan
This person is left handed (hence using R hand to perform the handshake)

Key steps :

1. prep the skin. Identify the largest structure in the neck (larynx) between THUMB and MIDDLE FINGER of non-dominant hand (leave the dominant free to cut!)

2. (use the 'LARYNGEAL HANDSHAKE' to confirm this is the larynx, remembering the cricothyroid membrane must lie inferiorly. Place your forearm on the patients chest or head to stabilise your hand.

3. raise the non-dominant INDEX finger, whilst keeping THUMB & MIDDLE finger located on the larynx

4. run the non-dominant INDEX finger inferiorly until identify the cricothyroid membrane

Consider the ergonomics of this. Ideally one needs to FIX the location of the cricothyroid membrane with the non-dominant index finger, allowing the incision to be made with the dominant hand.

Where will you stand? On the patients left or right? Which hand will you use? Supposing access to the neck is limited?

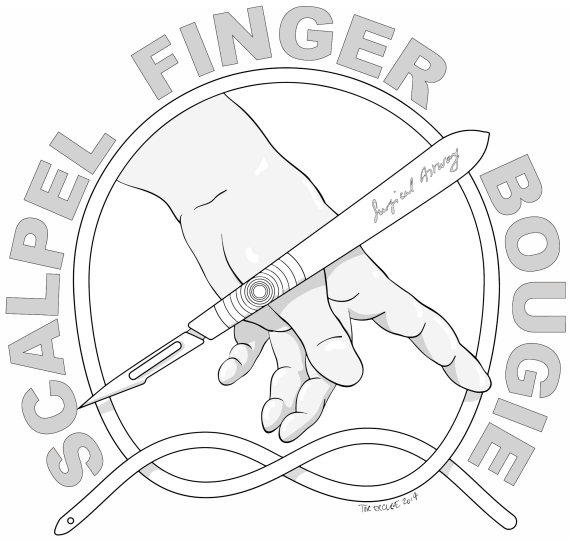
Mental rehearsal, visualisation and task-training can transform this somewhat challenging procedure into a straightforward one. Remember there WILL be blood and the procedure is mostly tactile, not visual.

Incision technique : SCALPEL-FINGER-BOUGIE

- Once the cricothyroid membrane is identified, cut ~ 2cm vertically through the skin. There will be blood. The rationale for a vertical incision is to ensure that the tissues overlaying the cricothyroid membrane are divided.

- Place your non-dominant index finger in the hole and re-identify the CTM.

- Now cut horizontally across the CTM. A puff of air/blood is not uncommon.
- One can either leave the blade of scalpel in the hole and rotate 45 degrees - or place finger in hole - and then pass a bougie into the trachea, then railroad an ETT.
- Inflate cuff, confirm position with capnography and secure the tube.



INTUBATION - NO DRUGS

Even the most seemingly obtunded patients are at risk of awareness and laryngospasm with attempts to pass an endotracheal tube. Generally outcomes for 'cold tubes' (no drugs) are very poor, reflecting the fact that such patients have lost protective airway reflexes and are peri-arrest or arrested.

Drug-assisted intubations empirically rapid sequence induction and intubation, remains the gold standard for management of the critically ill airway.

This does however pose a significant risk for the 'occasionalist' airway operator, particular those whose exposure to management of critically ill airways is limited. Moreover, there are significant situational, anatomical and physiological challenges in the prehospital environment, which can prove difficult for even those comfortable with intubation in the elective setting.

Certainly many ambulance services have allowed paramedic intubation without drugs for those patients with zero protective airway reflexes, typically those in cardiac arrest. Historically resuscitation teams may have abandoned CPR during intubation attempts, worsening outcomes. We would recommend placement of a supraglottic airway (iGel) in the arrested patient, the goal being to rapidly restore alveolar oxygenation.

Intubation is a motor skill and there is significant risk of task fixation, loss of situational awareness and causing harm, even without use of drugs. If a 'cold' intubation is necessary (ie without drugs) then meticulous attention to technique and passage of time is necessary.

- position appropriately
- ensure working laryngoscope with bright light
- lead with suction to decontaminate
- identify midline structures - nose : philtrum : uvula : epiglottis : glottic opening
- pass a bougie, then railroad the endotracheal tube into the trachea
- inflate cuff, secure and confirm placement with waveform capnography

NOTE - arrested patients will still generate ETCO2. However a rise of ETCO2 to > 10mmHg above the baseline may indicate ROSC.

If airway patency and protection contributes to recovery, then post ETT sedation maybe required. A rise in heart rate and/or blood pressure may be clue of the intubated patient at risk of awareness. Be prepared to provide sedation, balancing this with a risk of decline in blood pressure.

It should be remembered that outcomes for 'cold' intubation are generally poor and emphasis should be on 'doing the basics well' ie maintaining oxygenation and ventilation by use of adjuncts, assisted ventilation and a supraglottic airway....buying time to allow adequate resuscitation and performance of a drug-assisted intubation once sufficient resources are on scene or patient is brought to a suitable facility

INTUBATION - DRUG-ASSISTED (Rapid Sequence Induction Intubation)

This is perhaps one of the highest stakes, tightly-coupled procedures in the pre-hospital environment.

Out-of-theatre RSI should only be carried out only by appropriately trained and equipped teams operating under robust clinical governance. Apart from the obvious emergent nature of the procedure, it is considered more 'high risk' than in-theatre RSI because of crew, resource, environment and patient factors. Every effort must therefore be made to minimise this risk and to ensure the safety of the procedure. In aviation and military settings it is well accepted, that the higher the acuity of the situation, the greater the need to remove individual procedural preference and the greater the need to adhere to a standard operating procedure.

Suffice it to say that this is a huge topic. It may therefore seem unusual that this topic receives less coverage here - however this reflects the need to limit discussion to clinicians who are already competent at airway management of the critically ill.

Key features include:

- considering carefully the need for intubation
- maximising first pass success via appropriate patient positioning, use of adjuncts and drug choice
- meticulous attention to preparation and technique; use of an RSI checklist is mandatory
- having well thought out rescue plans and plans to troubleshoot difficulty
- preparation of a post induction sedation and ventilation strategy

Indications for RSI

The decision to proceed with an out of theatre RSI must be based on an informed assessment of the risk of the procedure versus the clinical benefits regardless of the indications listed. The team must take the following factors into consideration:

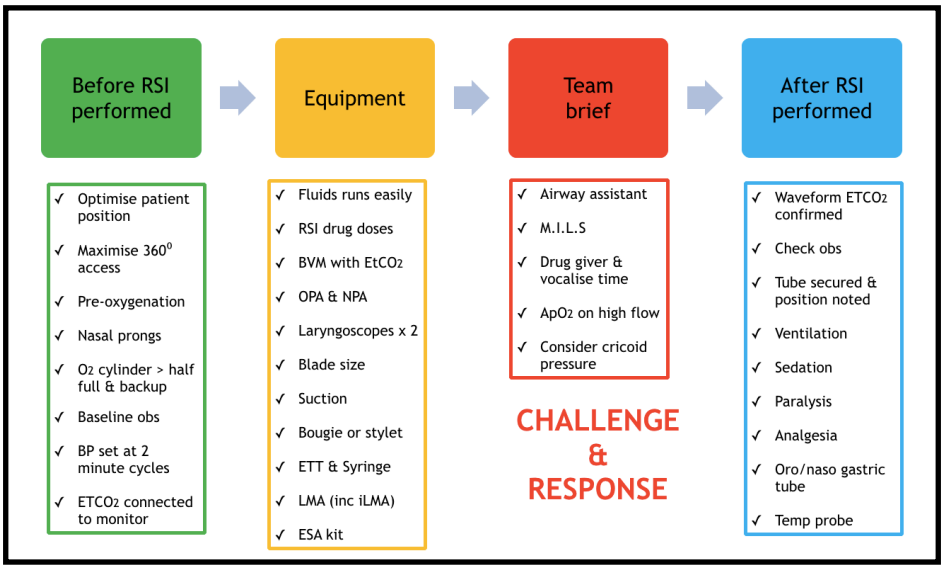
Factors in favour of RSI	Factors against RSI
Impaired airway maintenance and/or protection	Awake conscious patient unlikely to deteriorate
Evolving airway injury e.g.: burns, haematoma, penetrating neck injury, high cervical injury with diaphragmatic breathing	Operator inexperience, poor predictors of success
Fluctuating or deteriorating GCS	Inability to provide rescue techniques if fails
Polytrauma with requirement for multi interventions and or procedures	Non-availability of induction agents or paralysing agents (vials damaged, time-expired, heat damage)
Prolonged transport with risk of deterioration in transit	Short distance to higher level care
Combativeness	Poor team dynamics, hostile environment etc

As with all airway management, RSI may be situationally, anatomically or physiologically challenging. If the decision to perform a pre-hospital RSI is being considered, we strongly suggest sharing this decision with retrieval coordinators.

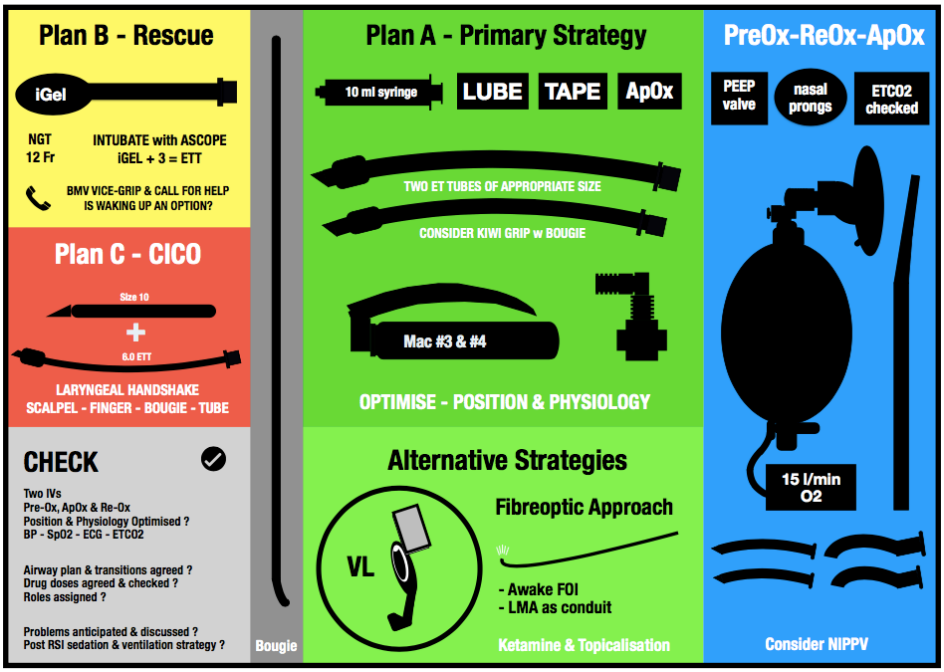
It is of course vital to ensure that the team dynamic is functional and that all roles are assigned and briefed. An airway plan may be as simple as :

Plan A Intubate	Mac 3 or 4 direct laryngoscopy, ETT, bougie, suction
Plan B Rescue Ventilate	iGel or BMV, orogastric drain
Plan C Surgical airway	Scalpel-Finger-Bougie-Tube

Use of a standardised approach eg pre-drawn doses of induction/paalysis agents (typically ketamine and rocuronium), an RSI checklist and kit dump can mitigate against cognitive overload and difficulties of situational urgency etc



Example of a prehospital checklist



Example of a kit dump structured to airway plans A, B, & C

MARCH - Airway Control : iGel

INDICATIONS

- apnoeic patient when endotracheal intubation is not possible or not available.
- patient must be unconscious, without a gag reflex
- failed airway

CAUTIONS

- obstructive lesions below the glottis, trismus, limited mouth opening, pharyngeal or laryngeal abscess, trauma or mass
- conscious or semi-conscious patients with an intact gag reflex
- do not allow peak airway pressure of ventilation to exceed 40cm H2O
- do not use excessive force to insert the device
- care should be taken with patients who have fragile and vulnerable dentition
- use care to avoid introducing lubricant in or near the ventilatory openings

PROCEDURE

- suction the airway prior to insertion as needed
- grasp the lubricated i-gel firmly along the integral bite block (tube portion of the device). Position so that the i-gel cuff outlet is facing toward the chin of the patient.
- patient should be in the “sniffing” position, with head extended and neck slightly flexed forward. If cervical injury is suspected, use modified “jaw thrust” instead of any flexion at the neck. The mouth should opened by gentle pressed down on the chin before proceeding to insert the i-gel.
- introduce the leading soft tip into the mouth of patient toward the hard palate.
- glide the device downwards and backwards along the hard palate with a continuous, but gentle push until a definitive resistance is felt. WARNING: Do not apply excessive force during insertion. If there is resistance during insertion, a ‘jaw thrust’ and slight rotation of the device is recommended.
- the tip of the device should be located into the upper oesophageal opening and the cuff should be located against the laryngeal framework. The incisors should be resting on the integral bite block.

POST PLACEMENT

- Auscultate breath sounds, check for chest rise and confirm placement with ETCO2 monitoring and SpO2 monitoring
- Attach SpO2 monitor and capnometer
- Secure the tube
- Place NG tube in side port and advance to appropriate position, apply suction to decompress the stomach
- Continue to monitor, sedate per protocol as necessary
- Consider definitive airway placement, if possible NB the iGel is a conduit for intubation if required

MARCH - Emergency Surgical Airway

INDICATIONS

Rescue technique if unable to oxygenate despite escalation from adjuncts, face-mask ventilation, supraglottic airway or placement of an endotracheal tube

Primary approach in rare occasions where entrapped and unable to access oropharynx by any means or when unable to access glottis eg supraglottic obstruction or massive contamination

Planned technique in a 'dual setup' approach to airway management (ie a single attempt at intubation, if this is impossible perform a rapid progression to FONA)

CONTRA-INDICATIONS

Ability to secure an airway with less invasive means

Airway trauma that renders access via the cricothyroid membrane futile e.g. laryngeal fracture, tracheal transection (in which case tracheostomy should be performed, or access achieved via the traumatic airway opening)

Children < 10 years of age (young children are prone to laryngeal trauma and they have a higher incidence of postoperative complications - performing a needle cricothyrotomy is generally advised, however life-saving surgical cricothyrotomy has been successfully performed in children

TECHNIQUE

- incorporate the decision to perform ESA as part of airway planning
- consider is this a PRIMARY or RESCUE approach for your patient?
- be mindful of ergonomics - where to stand, non-dominant hand to identify anatomy
- place forearm on patients chest (or head) to stabilise
- perform the laryngeal handshake with thumb and middle finger
- identify the cricothyroid membrane with index finger
- initial vertical incision through skin
- re-finger the hole and identify the cricothyroid membrane
- next a horizontal incision through cricothyroid membrane
- Insert finger to re-identify and confirm trachea entered
- pass bougie then ETT into trachea
- beware right bronchus intubation
- inflate cuff confirm waveform capnography, secure tube and proceed
- ensure post intubation sedation and ventilation strategy is articulated to the team

MARCH - Airway Control : RSI

To maximise first pass success without hypoxia nor hypotension, we recommend the following as a routine:

- *perform RSI at the rear of the ambulance, on a stretcher with ready access to oxygen, suction, lighting and protection from the elements : avoid RSI on the floor or with limited availability of oxygen, suction etc*

- *use an RSI checklist, ensure equipment available and working*

- *ensure an airway plan is articulated and all team members are aware*

- *elevate the occiput using a SAM splint to resemble optimal positioning*

- *pre-oxygenate : if patient is competitive or impossible to make a seal, use a non-rebreather mask at maximal flow rate*

- *position nasal cannula ready to deliver oxygen once apnoeic*

- *ensure two large bore IVs present and pre-load with volume to avoid hypotension : optimise patient physiology where possible*

- *reduce standard induction agent doses in the patient with hypovolaemic shock*

- *ensure immediate administration of rapid-acting paralysing agent via flush once immediately after induction agent is administered*

CONSIDER USE OF KETAMINE 0.5-1.0 mg/kg
and
ROCURONIUM 1.5 mg/kg

- *ensure the airway is decontaminated via suction; if there is massive contamination eg: GI bleed, regurgitation etc, consider implying the SALAD technique or deliberately place an ETT in the oeosphagus as a conduit*

- *talk through what you see, share the mental model*

- *remember to perform careful epiglottoscopy, identifying midline structures*

- *if you experience difficulty with intubation, minimise multiple repeated attempts but instead move swiftly to rescue techniques (bag mask, supraglottic, emergency surgical airway)*

- *anticipate & plan for post intubation difficulties e.g.: hypotension, awareness, sympathetic stimulation, development of tension pneumothorax etc*

Plan A INTUBATE, Plan B RESCUE VENTILATE, Plan C SURGICAL AIRWAY

3.2.4 Respiratory

A pneumothorax is an abnormal collection of air or gas in the pleural space that separates the lung from the chest wall. Any pleural injury communicating with the atmosphere will lead to a pneumothorax. Usually the air leak is secondary to laceration or puncture of the visceral pleura by bone fragments of fractured ribs. Large volume continued air leak in the context of a pneumothorax represents major laceration of lung parenchyma or damage to major airways.

The "classic signs" of life threatening tensioning of a pneumothorax (absent breath sounds, hyper resonance to percussion and tracheal deviation) as taught on many courses are actually not that classic. There are multiple case reports of diagnostic difficulty or missed diagnosis because of an absence of "classic signs".

There are two distinctly different patient populations that need to be considered as separate entities:

- The patient who is spontaneously ventilating
- The patient under positive pressure ventilation

Self ventilating patients generally develop tension slowly, if at all

Universal 99%	Common 50-75%	Occasional <25%	Rare <10%
Chest Pain	Tachycardia	↓ Sp02	Cyanosis Hyper-resonance
Respiratory Distress	Ipsilateral ↓ AE	Tracheal deviation	Hyper-expansion Hypo-mobility
		↓ BP	Cardiac apical displacement
			Sternal resonance epigastric pain

Positive pressure ventilated patients may tension rapidly

Universal 99%	Common 50-75%	Inconsistent <20%
↓ Sp02	High Ventilation Pressures	Venous Distension
↓ BP & ↑ HR	Ipsilateral ↓ AE Hyper-expansion Hypo-mobility	Cardiac apical displacement
Surgical Emphysema	Tracheal Deviation	

NEEDLE & FINGER THORACOSTOMY

A patient with chest trauma may show no initial signs of compromise but it is important that reassessment occurs throughout extrication, packaging and transport. Warning signs may include:

- agitation
- problems getting saturation readings
- hypotension with no obvious cause
- rising airway pressures

INTERVENTION OPTIONS

(i) NEEDLE DECOMPRESSION - awake patient, spontaneously ventilating

Indications: Peri-arrest situation prior to performing a more formal thoracostomy
Respiratory distress in the trapped patient breathing spontaneously.

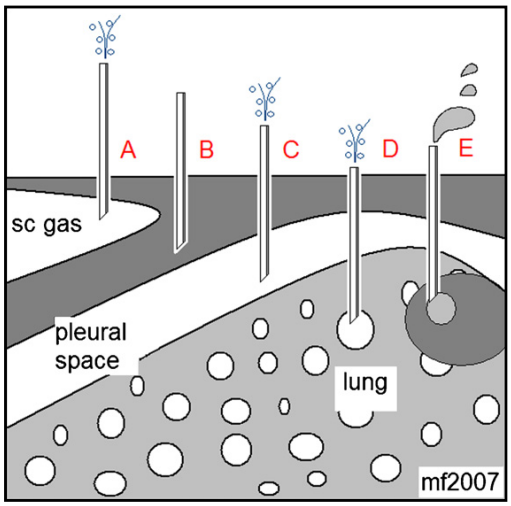
Advantages: Quick

Disadvantages: Gives the impression chest problems have been dealt with.
Only partially relieves the obstructive element to the shocked state
Does not facilitate complete (if any) lung re-expansion.
Cannula can track back out of pleural space & ceases to function.
Cannula can kink and obstruct
Cannula does not penetrate the chest cavity.

Needle, not finger thoracostomy remains the preferred approach in the spontaneously ventilating patient in the prehospital setting.

A bilateral tension pneumothorax will cause obstructive shock (think of this as a form of cardiac tamponade preventing cardiac function and requires bilateral needle or finger decompression - see also section 3.4 Traumatic Arrest)

Many adults have soft tissues greater than the length of a 14G cannula in the 2nd intercostal space (ICS) in the mid-clavicular line (MCL). As an alternative, consider placement in the 4-5th ICS anterior axillary line (AAL). The image below shows needles placed far too low in AAL !



Above is from Fitzgerald (2007), showing problems with needle decompression

(ii) FINGER THORACOSTOMY - unconscious patient, under positive pressure ventilation

Indications: Pneumothorax in a patient undergoing positive pressure ventilation
Actual or near traumatic cardiac arrest
Shocked trauma patient with no apparent cause

This procedure can only be used in patients undergoing positive pressure ventilation. The process is the same as the initial aspect of inserting a chest drain but there are important points to reinforce:

- the incision landmark should always be identified by counting intercostal spaces from the Angle of Louis (2nd rib). Failure to do this commonly results in malplacement of the incision. Do not assess their position in relation to nipple line or other soft tissue markers.

- the presence of surgical emphysema and flail segments can make placement of the incision over the 4th or 5th intercostal space difficult.

- bleeding from the subcutaneous tissues in the axilla would normally be compressed by the drain and sutures. This effect is not present in simple thoracostomy. Blunt dissection is essential to limit the effect of any bleeding.

- the hole through intercostal muscles should allow free insertion of a finger without pushing. This will require some of the intercostal muscle being "stripped" off the rib.

- maxi-swab prep and clean sterile gloves should be used to undertake the procedure.

- if pneumothoraces are suspected and the patient is undergoing intubation, thoracostomy should be performed as soon as possible i.e. a minute or two] after endotracheal intubation whilst the tracheal tube is being secured. Be aware, only a few positive pressure breaths via a BMV can turn a small simple pneumothorax into a significant tension pneumothorax. The chest can often be prepped whilst the kit dump for the intubation is occurring.

- in a peri-arrest situation needle chest decompression should be considered and bilateral needle decompression performed while intubation is taking place, followed by finger thoracostomies.

Advantages: The lung can be felt to re-expand

If the patient persists in a shocked state during transport, the thoracostomy can be "re-fingered" (using clean sterile gloves each time) to ensure the lung is up and working thus excluding one cause of obstructive shock.

Avoids placement of chest tube on the prehospital scene

Avoids risk of re-tension caused by blockage and kinking of drainage systems.

Disadvantages: Invasive

Risk of thoracostomies becoming occluded by patient's arms when packaged.

Minimal drainage of smaller haemothoraces

Abducting and externally rotating the arm to place a finger or tube thoracostomy can cause humeral IO devices to kink or dislodge

A common mistake with finger thoracotomy is to place TOO LOW as in this picture

Make a pint to identify the 4-5th intercostal space, anterior axillary line - it is typically close to the axillary hairline, not the nipples!

We would also recommend DOUBLE-GLOVING in the presence of known or suspected rib fractures eg flail chest, blunt trauma chest

MARCH - Respiratory Control : Thoracostomy

Indications	needle thoracocentesis for spontaneously ventilating patients, **or** peri-arrest as a prelude to finger thoracostomy for patients under positive pressure ventilation, **or** as part of traumatic arrest algorithm
Process	
Needle	*place needle in either second intercostal space, midclavicular line or in the 4th or 5th intercostal space, anterior axillary line*
Finger	*with the patient supine abduct the arm between 45 and 90 degrees, use a 'thumbs down' or 'Scarecrow' position to avoid dislodgment of humeral IO devices* *prep the distal axillary area with betadine or chlorhexidine swabs.* *put on sterile gloves and make a 4-5cm incision along the line of the ribs in the 4 or 5th intercostal space just anterior to the mid-axillary line (AAL)* *use a scalpel for the skin only. Thereafter use Spencer Wells forceps (in a pinch, Howard Kelly forceps will suffice) to allow blunt dissection through the intercostal muscles* *make a hole of sufficient size to push a finger into the pleural cavity. Be careful when placing fingers in the incision, as there may be fractured ribs that are sharp* *ensure the lung is felt to be fully expanded* *leave the soft tissues to fall back over the wound, which will act as a flap valve.* *be prepared to re-finger the hole and ensure lung inflation if there is clinical suspicion of deterioration*

FLAIL CHEST

Patients with severe flail develop respiratory compromise due to inefficiency of ventilation from the incomplete chest wall and impaired gas exchange due to underlying lung contusion.

Consider intubation for: Ventilation requirements (hypoxia and hypercarbia)
Anticipated clinical course
Humanitarian reasons.

Look carefully for flail - it may be subtle; whilst paradoxical chest wall movement is diagnostic, you will need to get down to the level of the chest wall and watch carefully on both sides to observe this unless massive. Patients with flail will nearly always have underlying pneumothorax and there should be a low threshold for chest decompression in patients with flail who undergo positive pressure ventilation.

OPEN CHEST WOUND

Patients who are intubated and receiving positive pressure ventilation need no further management of an open chest wound beyond ensuring that it remains open and the patient doesn't develop a tension pneumothorax - the wound generally functions as a simple thoracostomy as air is expelled when under positive pressure

In patients who are self ventilating and at risk of ventilatory compromise the best solution is to place a formal chest drain on the affected side and then place a dressing over the wound. The wounded area can be properly explored and sutured under more sterile conditions in the receiving hospital.

If this is not available (as in the pre-hospital setting), then use of a commercial chest seal may be required. Three sided dressings have limited success in this group of patients. Invariably the dressing doesn't stick to the skin properly, usually due to bleeding and diaphoresis. We recommend the Hyfin or Russell chest seals.

- Assess the chest wall and identify any open wounds (front, sides or back)
- Peel off backing to expose adhesive side of chest seal and apply over the wound
- Ensure a good seal of the dressing. If it does not fully cover the wound or is not big enough then a sheet of GladWrap or a damp saline soaked swab can be used. The OLAES modular bandage contains a clear sterile sheet for this purpose

If there are multiple wounds or you have no seal then apply an improvised 3 sided dressing:

- place a square of non-porous material (such as plastic dressing packaging) over the wound (the OLAES modular bandage contains a clear sterile sheet for this purpose)
- tape the dressing on the top and both sides using adhesive tape & leave the bottom of the dressing free, to act as a one-way flap valve and allow any blood to drain out of the chest.

CARDIAC TAMPONADE

See ‘traumatic cardiac arrest’ section

3.2.5 Circulation

This section discusses

IV and IO access
Upgrade of IV access with RIC kit
Splinting

INTRAVENOUS (IV) ACCESS

Think carefully about the need, timing and route of establishing access. Clearly there is often a need for access to the circulation, not least for administration of analgesia, emergency medications, loading with tranexamic acid, & judicious use of fluids.

Always consider 'does this patient need access now?' The entrapped patient may be able to receive analgesia via inhaled, IM, IN or IO routes. Attempts to gain access may hinder or delay extrication efforts. Whilst there may be a reflexive perceived need to restore 'normal' blood pressure in the shocked patient, there is a real risk causing more harm by inducing hypothermia, diluting clotting factors and of course raising BP such that bleeding worsens.

for the mentating patient with a palpable radial pulse and NO head/spinal hypoperfusion,
consider NO fluids

for the patient with impaired mentation, cerebral or spinal hypoperfusion,
consider judicious aliquots of 250ml crystalloid titrated to radial pulse and mentation

Ideally patients with evidence of hemorrhagic shock and compromise should receive warmed products, preferably blood. This may be difficult in the prehospital setting, although on occasions O negative may be available from a nearby hospital and brought to scene. Conversely rapid extrication and transport to a centre with surgical capabilities is preferable.

For patients with distributive shock (eg: spinal injury or sepsis), large volumes of crystalloid may be required, along with vasopressor support. This can be administered peripherally in the first instance, taking care to ensure the IV is placed in a large vein and flowing well. IO access offers delivery to the central circulation and may be preferred. Remember of course to prioritise treatment of haemorrhage shock in the context of trauma.

Timing - it may be better to leave establishment of IV access until the patient has been extricated. This minimises both delays to extrication (whilst establishing access in a cramped environment) and risk of dislodgement (during extrication phase).

Route - for the entrapped patients with immediate needs (eg: analgesia to facilitate extrication, patient in cardiac arrest), rapid access to the central circulation can be established via an IO to the humeral head. For IV access, select a large vein and place a large bore IV. Secure lines securely, preferably with a 'mesentery' of tape.

On occasions IV access may have to be established with a small bore line and upgrade. For established IV access that is of small diameter, consider

(a) placing a venous tourniquet approximately 20cm proximal to the IV; infuse abbot 50ml of crystalloid to make occluded veins even more distended. Then cannulate the engorged vessel with a larger bore IV
or
(b) for a cannula of 20G or larger, consider upgrading with a rapid infuser catheter (Seldinger technique); this can upgrade a 20G cannula to a 7Fr.

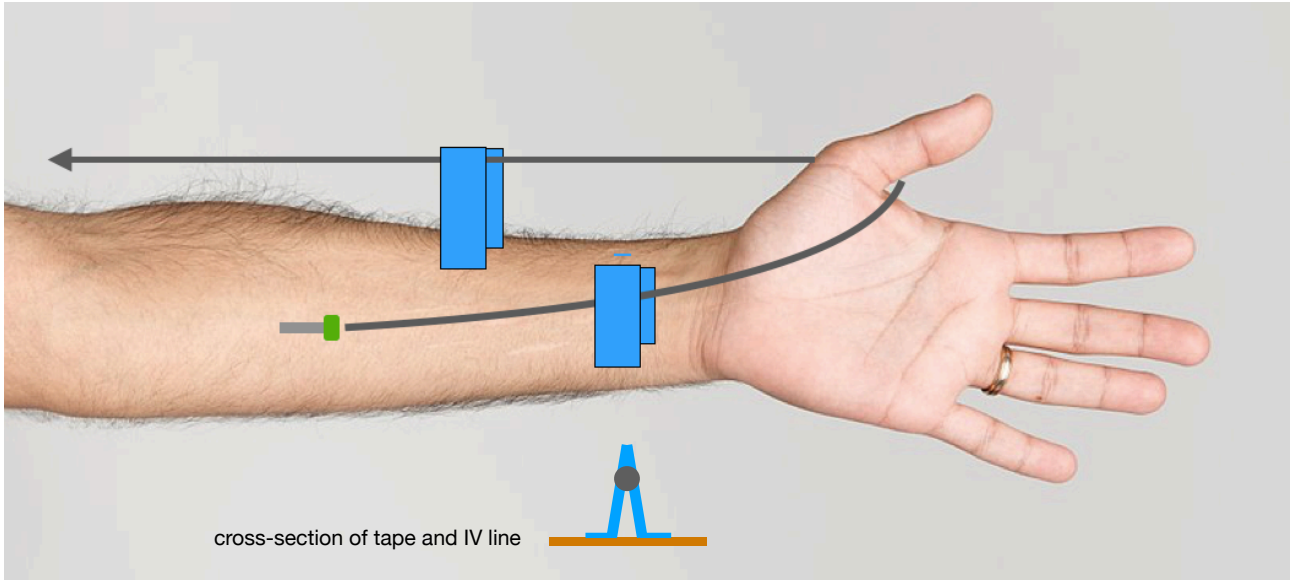
Once IV access is established, bear in mind that the prehospital environment and subsequent transfer poses a high risk of dislodgement. It is prudent to place TWO IVs as soon as circumstances allow.

"Two is one and one is none"

Securing lines with a mesentery of tape :

Secure the IV in the usual manner (opsite or tape over the cannula and hub where meets the skin).

Once lines are attached, use tape to create a 'mesentery' - enclose the IV line in this and repeat on at least two occasions. For extra protection from accidental tugging, wrap the IV line around the thumb.



Use of tissue adhesive :

Critical lines may be secured with a tiny dab of cyanoacrylate tissue adhesive (histacryl etc) where the cannula meets the skin. Be careful not to glue the hub to the cannula, preventing detachment and line changes in the receiving facility! If you do use tissue adhesive, make sure that this is handed over to the receiving facility, as this practice is not (yet) common practice. Glue can be removed with petroleum jelly.

See https://www.thecommongood.org.au/using-superglue-to-secure-iv-lines

INTRAOSSEOUS (IO) ACCESS

IO access offers a rapid route to the central circulation, using the medullary space as a non-collapsible entry point. This may be the preferred choice in :

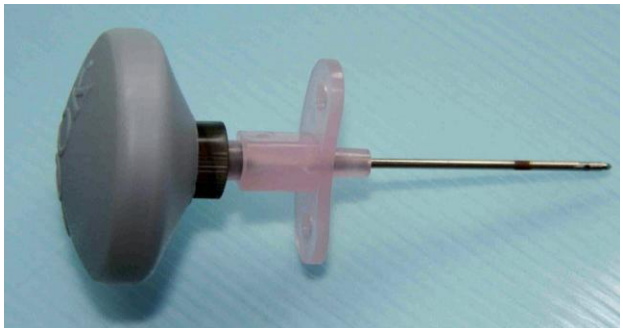
- cardiac arrest
- entrapped patients
- patients with known or likely difficult IV access (eg obese, paediatrics, burns)
- As a temporising measure eg for analgesia to allow extrication, then IV placement

Preferred devices

The old-fashioned 'Cooks catheter' screw in type IO device may still be found in some rural resus bays. These could be hard to place and may have an alarming tendency to 'give' or even transect bone causing extravasation, due to the significant manual force required.

Commercial devices include the Bone Injection Gun (BIG) and the EZ-IO drill. Careful training is required with these devices. In inexpert hands, the BIG may fail, due to failure to lock hand and wrist, allowing recoil from the spring to be absorbed into the operators hand, rather than drive the needle into the bone. On occasions, even trained operators have misfired the device into their own hand! These devices often fail when used by humans under pressure.

In contrast, the EZ-IO device offers excellent tactile feedback. However the device is dependent on a proprietary battery and inadvertent trigger activation in a prehospital bag can deplete the device without the user being aware. Always ensure the trigger guard is in place when not being used!



Cook's catheter (manually driven)

Bone Injection Gun (spring driven)

A range of IO needles and the EZ-IO drill (battery driven)

Preferred sites for IO access

Whilst sternal IO devices are common in military settings (where limbs may be damaged or absent due to blast injuries), most commercial devices for use in the prehospital setting in Australia are designed for placement in peripheral sites, typically the flat part of the tibia or the humeral head.

CAUTION - avoid use in obviously fractured limbs and do not use the tibia if there is a suspected femoral or pelvic injury. The humeral head may be easily accessed even with entrapped patients. It is also easy to access whilst managing the airway etc.

Proximal humerus - slide thumb up the anterior shaft of the humerus until you feel the greater tubercle, this is the surgical neck. 1 cm above the surgical neck is the insertion site

Many texts describe insertion with the patient's hand resting palm down on their abdomen, with the elbow adducted. The 'scarecrow' trauma position may be preferable. This allows easy access to both the humeral head and the anterior axially line 4th/5th intercostal space (for finger thoracostomy).

Use of the 'scarecrow' or cruciform position will also prevent inadvertent dislodgment of the IO if the arm is subsequently moved to place an intercostal catheter or finger thoracostomy. ie if you need to abduct the arm (eg. for thoracostomy), keep the thumbs down (ie. have the arm internally rotated at the shoulder). Otherwise the IO catheter may bend or fall out as it impinges on the acromion.

Rule of 45s:

- 45mm needle
- 45° angle between shoulder & head
- 45° to anterior plane

Benefits vs tibia:

- meds from syringe to R atrium in 3 sec
- flow of 5L/hour (vs 1L/hour)
- can be used with pelvic/abdo trauma
- less pain in conscious patient

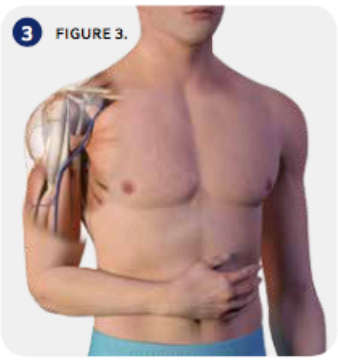
Alternative sites include:

Proximal tibia - 2 finger breadths below the patella and 1-2cm medial to the tibial tuberosity in adults

Distal tibia - 3 cm proximal to the most prominent aspect of the medial malleolus. Then place one finger directly over the medial malleolus and then move ~ 2 cm proximal. Palpate the anterior and posterior borders of the tibia to ensure that the insertion site is on the flat central aspect of the bone.

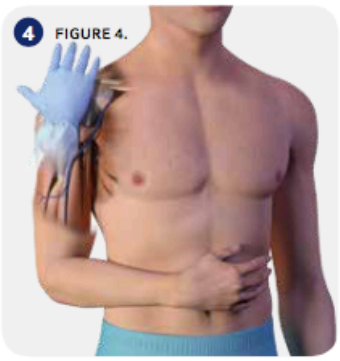
Infusion through the device causes more pain than the insertion itself, as the insertion only involves a small cutaneous and bone site, but the infusion triggers multiple intraosseous pain receptors. The administration of 2% lidocaine prior to starting an infusion is said to considerably reduce pain scores. This is not necessary in severely obtunded patients.

IDENTIFY THE PROXIMAL HUMERUS:



3 FIGURE 3.

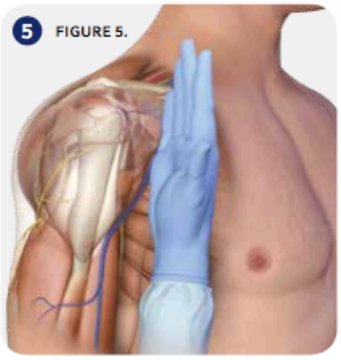
Place the patient's hand over the abdomen (elbow adducted and humerus internally rotated.)



4 FIGURE 4.

Place your palm on the patient's shoulder anteriorly.

- *The area that feels like a "ball" under your palm is the general target area.*
- *You should be able to feel this ball, even on obese patients, by pushing deeply.*

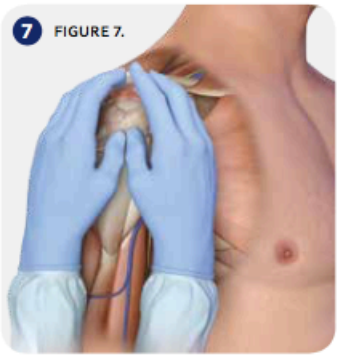


5 FIGURE 5.

Place the ulnar aspect of one hand vertically over the axilla.

6 FIGURE 6.

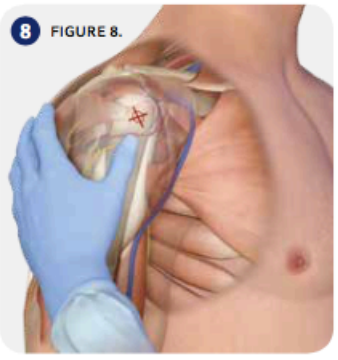
Place the ulnar aspect of the opposite hand alon g the midline of the upper arm laterally.



7 FIGURE 7.

Place your thumbs together over the arm.

- *This identifies the vertical line of insertion on the proximal humerus.*



8 FIGURE 8.

Palpate deeply as you climb up the humerus to the surgical neck.

- *It will feel like a golf ball on a tee – the spot where the "ball" meets the "tee" is the surgical neck.*
- *The insertion site is on the most prominent aspect of the greater tubercle, 1 to 2 cm above the surgical neck.*

9 FIGURE 9.

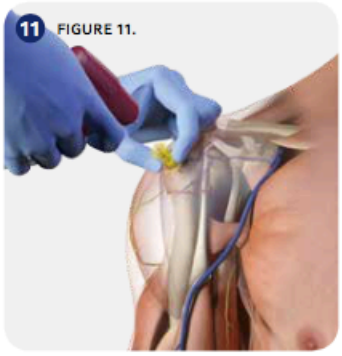
If necessary, for further confirmation, locate the inter-tubercular groove:

- *With your finger on the insertion site, keeping the arm adducted, externally rotate the humerus 90-degrees.* ***You may be able to feel the inter-tubercular groove.***
- *Rotate the arm back to the original position for insertion.* ***The insertion site is 1-2 cm lateral to the inter-tubercular groove.***

10 FIGURE 10.

Insertion:

- *Prepare the site by using antiseptic solution of your choice (e.g. Chlorhexidine).*
- *Remove the needle cap.*
- *Aim the needle tip downward at a 45-degree angle to the horizontal plane. See Figure 10.* ***The correct angle will result in the needle hub lying perpendicular to the skin.***



11 FIGURE 11.

- *Hold the hub in place and pull the driver straight off. See Figure 11.*

- *Push the needle tip through the skin until the tip rests against the bone.*
- *The 5 mm mark from the hub must be visible above the skin for confirmation of adequate needle length.*
- *Gently drill into the humerus 2 cm or until the hub reaches the skin in an adult.*
  Stop when you feel the "pop" or "give" in infants and children.
  Avoid recoil by actively releasing the trigger when you feel the needle set enter the medullary space – do NOT pull back on the driver when releasing the trigger.

MARCH - Circulatory Control : IV & IO access

INDICATIONS FOR IV or IO ACCESS

- *rapid administration of analgesia, emergency medications or fluids.*
- *IO may be preferred in cardiac arrest, entrapped patient, difficult IV access*
- *for transport* ***"two is one, one is none"***

CAUTIONS

- *beware 'popping the clot' with inappropriate or overly aggressive use of crystalloid*
- *minimise fluids, to minimise hypothermia, dilution of clothing factors & bleeding*
- *beware causing delay whilst attempting to insert IVs instead of early use of IO*
- *beware insertion over infected or unclean skin*
- *beware misplaced IV or IOs*
- *beware accidental dislodgment of IVs - secure with mesentery*
- *beware bending of humeral IO against acromion if the arm is externally rotated and abducted (eg for finger thoracostomy - remember 'thumbs down' or "scarecrow')*

CIRCULATION CONTROL

Remember to **LOAD WITH TRANEXAMIC ACID** 1g over 10 mins, in first three hours

Keep patient **WARM**

SPLINT to **ANATOMICAL ALIGNMENT**

PENETRATING WOUNDS - leave object *in situ*; if haemostasis is required, consider use of a Foley catheter to improvise a tamponade within the wound

Remember **CRYSTALLOID DOES NOT CARRY OXYGEN**

BEWARE of **'POPPING THE CLOT'** with crystalloid. Overzealous use can :

- dilute clotting factors
- worsen hypothermia
- increase bleeding especially from concealed venous ooze eg pelvis

If **BLOOD** is what they are **BLEEDING**, then **BLOOD** is what they are **NEEDING !**

If there is **CONCEALED** haemorrhage, early **SURGICAL INTERVENTION** is required

The **BEST RESUSCITATION FLUID** may be **DIESEL** (or Av Gas !)

UPGRADE OF IV - RAPID INFUSER CATHETER

The Rapid infuser Catheter (RIC) can be used to upgrade and existing line where large flow rates are required e.g.: administration of warmed blood products.

A standard IV is placed (the RIC can be passed through a 20G or larger cannula). A guide wire is passed through into the vessel and the IV cannula removed.

The RIC is advanced using a gentle wriggling motion, ensuring the dilator advanced first and cannula stays attached to dilator. RIC cannula is then advanced and guide wire and dilator removed.

This can rapidly convert a 20G to 7Fr, then secure with suture or histacryl adhesive.

See https://lifeinthefastlane.com/ccc/ric-line/

SPLINTING

Early splinting of bony injuries will aid both haemostasis and pain control.

Splints should be applied early, remembering to splint to skin.

Available devices include

- for distal limbs, the SAM splint is recommended.

It is lightweight, portable waterproof and can be moulded to shape.

It can be used to give extra shape or rigidity to the walls of prehospital packs

- for pelvic injuries, immobilisation is recommended as soon as possible. A pelvic binder may be placed ready on vac mat or stretcher in anticipation of a pelvic injury based on knowledge of the mechanism of injury.

- for femoral fractures, femoral traction devices are recommended e.g.: the CT-6 (top) or shorter Slishman (bottom) splint.

Note the Slishman splint does not extend beyond the ankle and so allows a better fit for transport.

MARCH - Circulatory Control : Splinting

Think 'FIND the BLEEDING, STOP the BLEEDING'

SPLINTING can help MINIMISE BLOOD LOSS and aid ANALGESIA

SPLINT to ANATOMICAL ALIGNMENT as soon as possible

For the conscious patient, provide adequate analgesia for fracture reduction

- inhaled analgesia (methoxyflurane)
- intranasal analgesia (fentanyl, ketamine, midazolam)
- intraosseus analgesia
- IV analgesia

Have SPLINTS READY as part of PACKAGING eg laid out on vac mat/stretcher

Available options include :

- SAM splints for distal limbs
- CT-6 or Slishman splints for fractures of humerus or femoral shaft
- Pelvic binder application based on mechanism
- Vacuum mattress offers additional spinal precautions

Always SPLINT to SKIN

Keep patients WARM and PRESERVE DIGNITY

If bleeding is known or suspected

- preserve blood volume
- load with TXA
- be cautious with crystalloid administration

MINIMISE PATIENT HANDLING
Use SCOOP, extricate to Vac Mat/Pelvic Binder

Pelvic immobilisation

There are a number of commercially available pelvic binders. Sandpiper clinicians should be familiar with the type of device used by their ambulance and retrieval services.

Common models include:

SAM Pelvic Sling

s

Pro - easy to apply, commonly taught on courses

Con - often applied too high; different sizes needed for different patients (larger standard, mall) sizes

T-Pod Pelvic Binder

Pro - effective compression

Con - a bit fiddly, not commonly taught on many courses

Prometheus Pelvic blnder

Pro - lightweight, compact, cheap, can be cut for eg access to femoral vessels/nerve block etc

MOST IMPORTANTLY ONE SIZE FITS ALL

Con - velcro can be fiddly, keep wrapped until needs to be used!

REMEMBER - SPLINT TO SKIN
COMPRESS OVER GREATER TROCHANTERS, NOT OVER ILIAC CRESTS!

3.2.6 Head Injury

Traumatic brain injury is sadly not uncommon, with younger patients over-represented in trauma statistics. Common mechanisms include vehicle crashes, assault and often compounded by underlying alcohol use, whereas falls are a more common cause in the elderly. The consequences of traumatic brain injury are often devastating, with victims likely to suffer loss of livelihood, independence and quality.

The most important consequence of head injury is brain damage. Crucially, it must be realised that this may arise as a direct result of the primary impact on the head, but also due to avoidable secondary insults at a later stage; chiefly hypoxia, hypercarbia, hypotension, or a combination of all three. Apart from superficial damage to the scalp, head injuries include skull fractures, focal brain injuries, diffuse brain injuries, and secondary brain damage.

It its important to consider that early management on scene - particularly avoidance of hypoxia, hypercarbia and hypotension - can have significant downstream benefits. Doing the basics well can contribute significantly t improved outcomes

Key skills include ability to conduct a focussed neurological assessment, including:

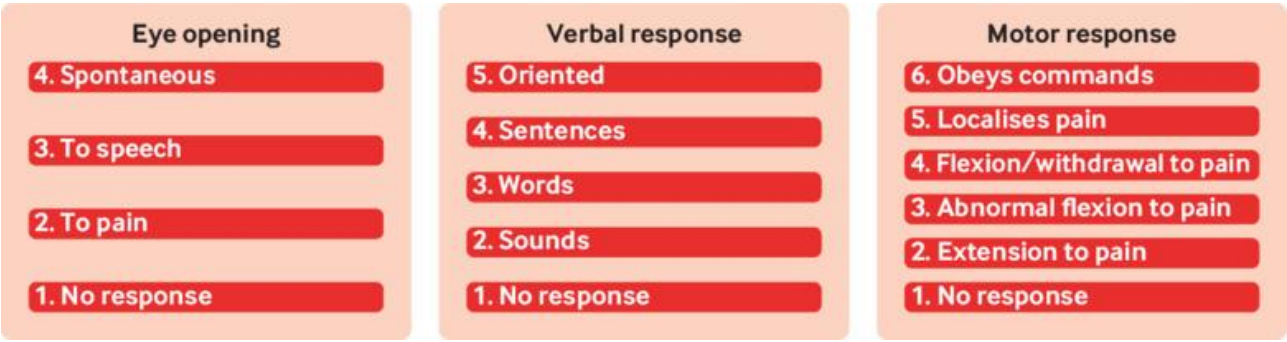
- ability to accurately record level of consciousness
- measurement of pupil inequality

LEVEL OF CONSCIOUSNESS

At its simplest, this can be assessed using the AVPU scale. It can also be measured on the Glasgow Coma Score, which allows accurate information to be conveyed to distant clinicians by telephone.

Repeated assessments give valuable trending information to allow decisions to be made regarding ongoing management

AVPU SCORE	Alert Responds to voice Responds to pain Unresponsive
GLASGOW COMA SCORE	EYE components (4) VERBAL components (5) MOTOR components (6) Maximum score 15 Minimum score 3



The GCS is often poorly applied and communicated. Common errors include failure to record the best score in each of the GCS categories (eye, verbal, motor) and failure to breakdown the score into

components. A GCS of 12 is meaningless - what is valuable is to break down into components eg E4V4M4 vs E3V5MV4 vs E4V5M3 to demonstrate not only the relative contributions of each component, but also to track change over time.

It is not uncommon for the GCS to be poorly remembered and it may be easier to describe what you see "Localises to pain, unintelligible speech, eyes open to pain only"

Use of the GCS easy help classify traumatic head injuries from mild, moderate to severe

GCS	13-15	Mild Head Injury
GCS	9-12	Moderate Head Injury
GCS	≤8	Severe Head Injury

Casualties with moderate/severe traumatic brain injury should be monitored for decreases in consciousness and pupillary state.

Treatment targets should be articulated to the prehospital team and active measures taken to achieve these targets:

- SBP should be >90 mmHg
- O2 sat > 90%
- end-tidal CO2 (If capnography is available, maintain between 35-40 mmHg)
- temperature extremes - hyperthermia worsens TBI, hypothermia worsens shock

Assume a spinal injury until cleared. Ideally such patients should be placed at 30 degrees head up - concerns of concomitant spinal injury preclude this, however the stretcher may be tilted to 30 degrees with patient remains in neutral spinal alignment.

PUPILS

Pupils are assessed for their equality and response to a bright light. Their speed of response must be recorded. A sluggish response may indicate a developing intracranial injury. Remember that a difference in size between pupils of up to 1mm may be normal.

A unilaterally dilated and fixed pupil is a sign of significantly raised ICP with a focal mass lesion. Bilaterally fixed dilated pupils is a ominous sign of bilateral brain stem compression. Small, unresponsive pupils are abnormal and may indicate mid brain pathology. Such pupillary abnormalities are an indication for neurosurgical consultation.

Of both GCS and pupils, perhaps the most ominous signs are abnormal posturing (whether decorticate or decerebrate) and pupil inequality.
Standard considerations apply in management of head injury

- aim for a decent MAP or SBP > 90mmHg
- avoid hypo- or hyperthermia

- ensure blood sugar is adequate
- aim for normocarbia and normoxia
- try to elevate head up 30 degrees (best done by tilting stretcher)

Other signs may be apparent - CSF leaks from nose or ears, depressed skull fractures, significant maxillofacial injures etc and should be noted and handed over to the receiving facility.

SCALP LACERATIONS - these can bleed significantly and early haemorrhage control (staples, sutures, hair ties) is advised

EPISTAXIS - this is not uncommon following blows to the face and RapidRhinos or EpiStats may be effective in arresting posterior and anterior haemorrhage. Soaking the Rapid Rhino in TXA may aid haemostasis.

MARCH - Head Injury

Think 'FIND the BLEEDING, STOP the BLEEDING'
(inside or outside the head)

RAPID ASSESSMENT OF CONSCIOUS STATE

AVPU or GCS (break down into components EVM)

PUPILLARY ASSESSMENT

BEWARE ABNORMAL POSTURING
and/or PUPIL INEQUALITY

AIM for :

SBP > 90 mmHg

NORMOXIA

NORMOCARBIA

NORMOTHERMIA

NORMOGLYCAEMIA

ASSESS FOR OTHER SIGNS

CSF OTO- or RHINORRHOEA
DEPRESSED SKULL FRACTURE
SCALP LACERATION
MAX-FAX INJURY inc EPISTAXIS

ASSUME CONCOMITANT SPINAL INJURY
SPINAL PRECAUTIONS

MINIMISE PATIENT HANDLING
Use SCOOP, extricate to Vac Mat/Pelvic Binder

3.3 Analgesia

Pain is a protective response to a harmful (or nocioreceptive) stimulus. Whilst there is clearly an underlying physiological mechanism, to pain, there is also a significant psychological component - past experience of pain, anticipation of pain and other factors can produce a wide variety in responses for patients across the same stimulus.

Prehospital medicine is no stranger to pain. Whilst a lot of medical training is focussed upon the underlying anatomical, physiological derangement and pharmacological strategies to address these, it is worth reviewing the modalities available to us.

Non-drug strategies for analgesia

- reassurance: this should involve use of names, a calm reassuring manner, touch and clear explanation of what has happened and what is going to happen.

- positioning: allowing the patient to find the position of least discomfort is advised. Patients may be able to support an injured body part themselves, but will often also need some form of support or splinting.

- distraction: the visual impact of blood or an injured body part can heighten anxiety and/or pain. Simply covering an injured body part can reduce immediate discomfort - and there is some evidence from wartime injuries that rates of PTSD are markedly reduce by covering injured or amputated limbs.

Whilst talking offers reassurance and a shared mental model' of what is happening, such distraction combined with allowing patients to adopt the position most comfortable to themselves may also alleviate pain. In some circumstances a patient previously unable to extricate themselves may be able to manage after such non-drug measures.

Ignore these techniques at your peril!

Drug strategies

A whole pharmacopoeia is potentially available. However the prehospital environment is necessarily austere and available medications are likely to be limited.

Be aware that ambulance volunteers will be able to administer two doses of methoxyflurane, with an option for a third dose on consult. However many ambulance services do not allow ambulance officers to administer medications such as fentanyl. Paramedics and intensive care paramedics will usually be able to administer opiates such as fentanyl or morphine, as well as ketamine. However there may well be a treatment ceiling in terms of maximal drug dose.

The Sandpiper clinician may bring additional flexibility to the prehospital scene, in situations where either operational or logistical limits exist for effective analgesia.

Options include : inhaled, oral, intranasal, intraosseous, intravenous, & intramuscular medications, as well as field and regional blocks.

Effective analgesia reduces sympathetic responses, lowers BP & prevents blood loss.

A suggested Formulary is included in Appendix Three.

Analgesic medications include methoxyflurane (inhaled analgesia), sublingual GTN (cardiac ischaemia), anxiolytics such as midazlolam (IN/IO/IV), opiates such as fentanyl or morphine (IN/IO/IV and IO/IV respectively) as well as the versatile agent ketamine (IN/IO/IV) which has the useful properties of analgesia, dissociation/sedation and even surgical anaesthesia depending on dose.

An approach to the injured casualty may involve:

- early use of reassurance, positioning, splinting and inhaled methoxyflurane
- weigh up pros/cons of IN or IO analgesia for extrication
- IN, IO or IV ketamine +/- fentanyl for painful procedures/fracture reduction etc
- establish secure IV access once extricated for ongoing analgesia and dose titration
- prehospital anaesthesia for humanitarian reasons or anticipated clinical course etc

ROUTE	**PROS**	**CONS**	**AVAILABLE OPTIONS**
Inhaled	Rapid onset Easy to administer	Limited dosing Needs intact sensorium	Methoxyflurane (Penthrox™)
Oral	Easy to administer Easy to store	Needs to be able to swallow Potential for vomiting	Aspirin Paracetamol Glyceryl trinitrate tablets
Sublingual	Rapid onset	Thermal lability	Glyceryl trinitrate spray Fentanyl lollipops or lozenges
Intramuscular / Subcut	Provides slow release	Slow, hard to titrate Injectable, sharps risk	Morphine Fentanyl Midazlolam Adrenaline
Intranasal	Rapid route Rapid onset Easy to administer	Need to use concentrated formulations Need Mucosal Atomisation Device	Fentanyl Ketamine Midazolam Naloxone
Intraosseous	Rapid route Rapid onset Titration to effect	Need to ensure correct site Pain on injection Need specific IO device	Fentanyl Ketamine Midazolam Naloxone Adrenaline etc etc
Intravenous	Rapid onset Titration to effect	Can cause delays if hard to establish Difficult in paediatric, obese or hypovolaemic Sharps risk on scene	Fentanyl Ketamine Midazolam Naloxone Adrenaline etc etc

DRUG DOSES

Purpose	Medication	Route	Dose
ANALGESIA	Fentanyl	Intranasal	2 mcg/kg
		IO or IV	0.5-1.0 mcg/kg titrate
	Morphine	IO or IV	50-100 mcg/kg titrate
	Ketamine	Intranasal	1 mg/kg
		IO or IV	0.25-0.5 mg/kg titrate
SEDATION	Midazolam	Intranasal	0.5 mg/kg
		IO or IV	2.5 - 5mg (adult) titrate
	Fentanyl	Intranasal	1.5-3.0 mcg/kg
		IO or IV	0.25-0.5 mcg/kg titrate
	Ketamine	Intranasal	10 mg/kg IN
		IO or IV	0.5 - 1 mg/kg (titrate)

Dose adjustment may be required in the elderly, in those with hypovolaemic shock or anticipated haemodynamic compromise. Small doses, titrated are preferable.

3.4 Traumatic Cardiac Arrest

Survival rates following traumatic cardiac arrest (TCA) are known to be poor but resuscitation is not universally futile. There are a number of potentially reversible causes to TCA and a well-defined group of survivors. There are distinct differences in the pathophysiology between medical cardiac arrests and TCA, requiring an approach to traumatic cardiac arrest that will differ from that taught on standard ALS and similar courses. As a result there is a risk that prioritising immediate interventions for TCA will cause concern amongst team members who may be more familiar with management of medical cardiac arrest, despite recent 2016 ANZCOR updates. It is essential to communicate the immediate management of TCA to the team, both on scene and in any subsequent debrief. Essential points are :

- unless there are injuries obviously incompatible with life, attempted resuscitation of patients with cardiac arrest due to trauma is not futile and should be attempted.
- the first priority in peri-arrest trauma patients is to stop any obvious bleeding. This may include direct pressure, tourniquets, splinting to alignment etc
- depending on the likely aetiology of the cardiac arrest, restoration of the circulating blood volume may have a higher priority than airway and breathing. If hypovolaemia is likely, an initial fluid bolus of 20mL/kg should be given as rapidly as possible.
- all patients in cardiac arrest with suspected chest trauma who are not responding to airway opening and restoration of circulating blood volume should have their chest decompressed.
- Obtunded/unconscious patients will need a patent airway - placement t of a second generation supraglottic device (iGel) is a priority over intubation
- surgical drainage of traumatic cardiac tamponade (with repair of cardiac laceration if required) is preferable to needle pericardiocentesis.
- cardiac arrest due to penetrating trauma is more likely to respond to emergency thoracotomy than is true in blunt trauma. A favourable outcome is rarely possible (even in penetrating trauma) if thoracotomy is initiated more than 10 minutes after the onset of cardiac arrest.

Key points

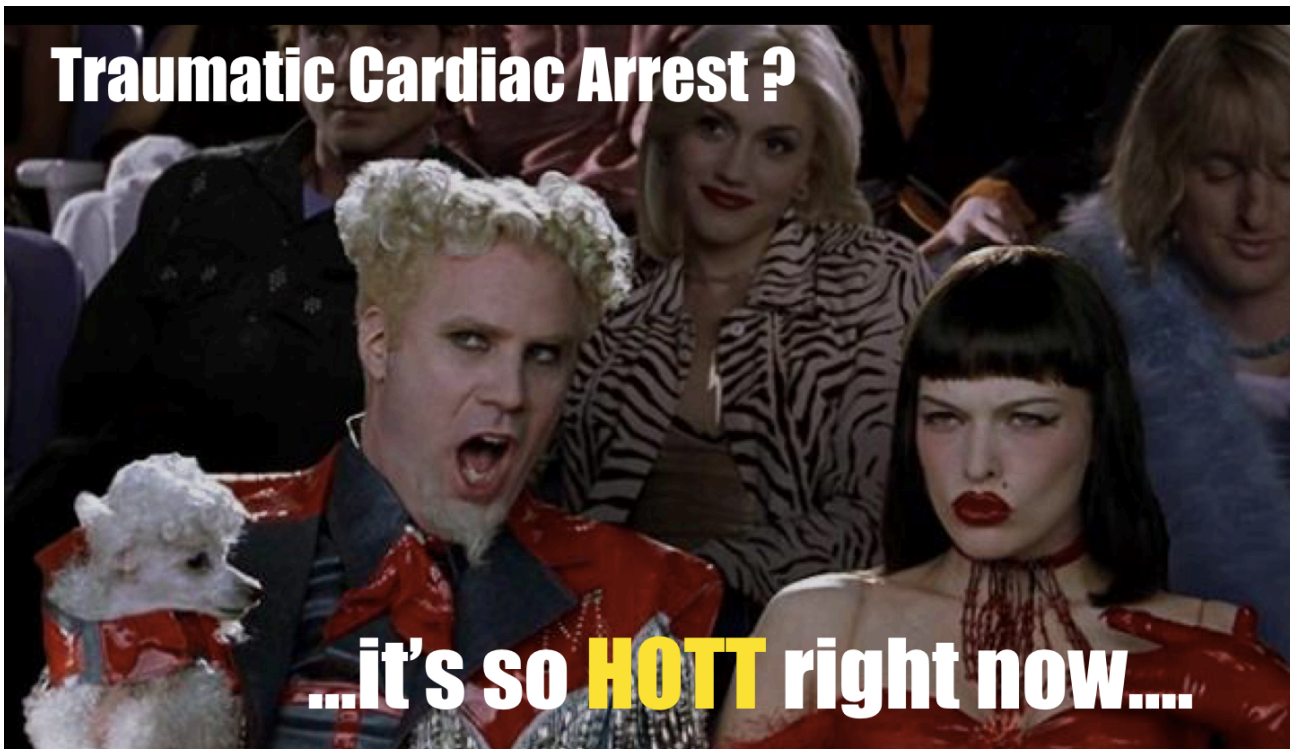
in cardiac arrest due to trauma, haemorrhage control, restoration of circulating blood volume, opening the airway and relieving tension pneumothorax should have priority over conventional cardiopulmonary resuscitation (CPR) unless a medical cause for cardiac arrest is reasonably suspected to have preceded the traumatic event.

Prolonged (>10 minutes) CPR in traumatic cardiac arrest after reversible causes have been addressed is almost never associated with a good outcome.

Most deaths due to trauma occur in the first five minutes following the traumatic event, and most of these deaths cannot be prevented, even with skilled and timely treatment.

The Dutch have coined the acronym 'HOTT" to aid recall of reversible causes of TCA under pressure

- Hypovolaemia (haemorrhage control)
- Oxygenation
- Tension pneumothorax
- Tamponade



Source : Zoolander

I
n practical terms, the Sandpiper clinician may have a role to play in :

- recognising traumatic arrest as distinct from a medical cardiac arrest, then
- instituting early, aggressive coordinated measures aimed at treating reversible causes

Suggested interventions will therefore include :

- splinting of limbs to anatomical alignment using available personnel
- application of tourniquets and direct digital pressure to identified bleeding
- early placement of an iGel or equivalent and rescue breaths to deliver oxygen
- concomitant bilateral needle or - preferably - finger thoracostomies
- bilateral IO devices and administration of 20ml/kg fluid load

If there is no response to the above, the resuscitation should be ceased. Opening the chest is NOT recommended in a rural setting!

What about tamponade?

Cardiac tamponade is present in 10% of TCA.

If tamponade is present or suspected, then this is a potentially reversible condition. Be aware that outcomes from penetrating traumatic arrest are significantly better than blunt traumatic arrest. Options include needle pericardiocentesis (rarely successful, but relatively easy to achieve) or open thoracotomy (typically a clamshell approach).

The decision to perform cardiac pericardiocentesis or thoracotomy is one to consider carefully, as it is highly likely to be subject to post hoc criticism. Especially in a prehospital setting and even more so in the rural setting.

A slow deterioration culminating in a witnessed arrest following a single stab to the heart may indicate a slowly accumulating pericardial tamponade which may be amenable to a needle pericardiocentesis - thus 'buying time' for transit to definitive care.

A rapid deterioration following gunshot wounds to the chest may be an indication for a resuscitative thoracotomy in a well-equipped emergency department...but in the prehospital setting, particularly in a rural environment, this is more problematic. Whilst it may be relatively easy for a trained clinician to open the chest, the problem remains what to do once inside....and how realistic subsequent transport will be.

Blunt traumatic cardiac arrest causing tamponade has a much less favourable outcome, often reflecting massive vessel disruption and ventricular tears. It is not recommended.

No fault should be attributed to clinicians who, by remaining within their scope of practice, do not perform a procedure to relieve tamponade

The decision to relieve tamponade needs to be contextualised to the patient (downtime, age, concomitant injuries), mechanism (penetrating e.g. stab or gunshot, blunt e.g. deceleration) and to the location (isolated rural roadside vs well-equipped ED).

"Think always - are my intentions honourable?"
(a comment from the late Dr John Hinds)

Whilst a clinician may be able to open the chest, is it really the right thing
for this patient in this location at this time?

Technique:

When traumatic cardiac arrest is identified in patients with penetrating trauma to the chest or epigastrium the following actions should occur; concurrent intubation and vascular access needs to occur with actions described below;

- Prep chest & wear sterile gloves (can be worn over disposable non-sterile gloves)

- Decompress the chest bilaterally by doing blunt finger thoracostomies). If significant air release suggesting tension pneumothorax as cause of arrest, reassess patient for return of cardiac output. If no return of output then;

- Make a broad incision following the 4th or 5th rib space bilaterally. This should connect the two thoracostomy incisions through skin and subcutaneous fat.

- Place finger in thoracostomy wound to "guard' lung and using sterile tuff cut shears extend the thoracostomy wound along the rib space to the sternum on both sides.

- Cut across sternum with sterile tuff cut shears (or a Gigli saw) to connect the two incisions. At this point extend both wounds posteriorly from the thoracostomy incision to the posterior axillary line.

- Open the chest in a "clam shell" fashion. If available having a person at the head of patient to retract the upper half of the chest can be very useful. If the chest doesn't open enough to get a view it is usually because the incisions don't go posterior enough. Use suction if required to improve your view.

- Identify the heart. Using forceps, lift the pericardium and make a small vertical incision using sterile scissors. If the pericardium is tense with tamponade it can be difficult to tent. Resist the

urge to use the scalpel to make the incision as this can result in damage to the myocardium. Extend the incision vertically the length of the heart.

- Remove any clots with your hands. This may result in spontaneous return of cardiac contractions or fibrillation. If no spontaneous cardiac activity results, try flicking the heart with your finger. If still no cardiac activity results commence cardiac massage using a flat, two handed technique, compressing from apex to base. The heart must be kept flat in its bed and not kinked on its pedicle. Have a second person compress the descending aorta against the spinal column. The objective of all this is to attempt to reperfuse the coronary arteries and ischaemic myocardium.

- If myocardial activity does return but is sluggish, 1 mg of adrenaline given IV or intracardiac to the right ventricle should be administered. Repeat doses should be given as required.

- If resuscitation is successful significant bleeding may result from the internal mammary arteries and these should be clamped. The patient will also require anaesthesia at this point.

Cardiac wounds

Small cardiac wounds may have minimal bleeding or be easy to control with digital pressure. Larger wounds may require careful mattress suture. Great care should be taken not to stitch over any coronary artery.

Ventricular Fibrillation

Place pads in normal position and close chest. Defibrillate as per normal. Beware of any pools of blood that may arc.

Triage

Any patient successfully resuscitated from prehospital thoracotomy must be rapidly transported to a hospital with cardiothoracic capabilities. The SITREP to the receiving hospital must include the information that a thoracotomy has been done and cardiothoracic attendance is required.

Debrief

Prehospital thoracotomy can be a confronting procedure. Whether successful or unsuccessful there must be a full debrief of all personnel involved in the resuscitation. Bystanders, including ambulance police and other rescue personnel may be traumatised by what they have witnessed. This debrief must include the rationale for the decision to undertake thoracotomy and the desired end-points, along with opportunities for further debrief later.

3.5 Preserving evidence

A trap for young players is failure to appreciate that the prehospital scene may be considered a crime scene.

A common situation is the need to preserve tyre marks and vehicle position by road crash investigation. Whilst such considerations should not prevent access to the casualty, please be mindful of access and egress routes and try to minimise disruption of the scene if there are likely to be forensic implications. This is likely if major crash investigation is required, typically if there is a fatality or severe injury.

Follow police instructions and be mindful to avoid driving over accident debris. We recommend parking some distance away from the incident site, utilise a single route of access/egress and perform a kit dump outside hot zone.

In the case of a stabbing, with subsequent deterioration and death, the unwary prehospital team may find that police wish to prevent access to bags and equipment as 'this is a crime scene' - another reason to always make a 'kit dump' outside of the immediate hot zone where possible!

3.6 Special cases

Certain patient presentations will require specialised skills or knowledge. These include

- obstetric cases
- neonatal and paediatric resuscitation
- envenomation and poisoning
- toxicological emergencies, including overdose
- acute medical or surgical conditions
- severe behavioural disturbance

These are not discussed further as management of such conditions forms part of the expected workload of the rural clinician and content is available via courses, textbooks and online. The basic principles apply fo both hospital and pre-hospital circumstances and clinicians should operate to their scope of practice or seek assistance from a retrieval colleague.

Considerations such as scene safety, SITREP, interagency communication, teamwork and so on are of course still relevant and can be extrapolated to these circumstances from the preceding pages.

4. Summary

Rural Australian communities are already served by excellent State-based ambulance and medical transport & retrieval services.

On rare occasions, a rural generalist clinician with specific training in prehospital care, may 'value add' to the prehospital scene. This role should be to support existing services, not to duplicate them - and certainly never to detract!

The Sandpiper model for rural Australia aims to build upon the success of schemes such as New Zealand's PRIME, the UK's BASICS and South Australia's RERN to enhance the safety of rural Australians.

Skills utilised as a routine in the hospital-setting will need to be contextualised to the challenging pre-hospital environment.

Formalised training for Sandpiper clinicians is recommended, covering components of

- tasking, responding, safety and audit
- teamwork, interaction with other agencies
- initial assessment, SITREP and scene management
- extrication and maintaining clinical momentum
- haemorrhage control
- airway
- chest trauma
- IO and IV access
- splinting
- head injury assessment
- analgesia
- traumatic cardiac arrest
- special cases (paediatrics, obstetrics etc)

Whilst Sandpiper Australia has a primary objective to equip rural communities with a Sandpiper Bag for use by 'their' clinician, the wider aim is to establish a network of appropriately trained rural clinicians and to ensure that they are assessed and signed off as competent in a limited suite of meaningful interventions.

This document has covered essential components which would be expected to be assessed during training of Sandpiper clinicians, with the expectation that clinical competency is demonstrated in key procedures and decision-making via task training and immersive simulation.

Establishment of the Sandpiper system across rural Australia offers an extra level of support, both for local rural community resilience as well as providing a cadre of trained and equipped clinicians for State or National disaster such as bushfire, earthquake, tsunami, cyclone or other.

Whilst this document was first prepared in 2018 in preparation for establishment of Sandpiper Australia, it is heartening to see that the 2020 Royal Commission into Natural Disaster Arrangements similarly recommends better integration of the primary care workforce into emergency service planning, preparedness and response.

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6. Appendices

Appendix One - South Australian RERN Clinical Record

RERN CLINICAL RECORD

Were you the first responder on the scene?	
What other Agencies were involved? E.g. SES, CFS, MedSTAR, Parks, RFDS,SAAS	
Interventions and/or procedures performed by the RERN Clinician	
Medications initiated and/or administered by RERN Clinician	

Reflections on case - use the 'zero point survey' as a framework (see https://resus.me/analysing-resus-1/) for more info on Zero Point Survey

SELF *(e.g. any issues with fatigue, preparedness, ability to complete tasks?)*
TEAM *(e.g. any issues in teamwork between agencies or individuals on scene?)*
ENVIRONMENT *(e.g. were there any particular challenges to this pre-hospital scene?)*
PATIENT *(e.g. are there any particular unusual clinical features of this case?)*

RERN CLINICAL RECORD

Part 1: RERN Clinician Details

Title		**Given Name**		**Surname**	
Address					
Mobile Phone		**Email:**			

Part 2: Callout details (where possible)

SAAS job NO: (MANDATORY)		**Date of call out**	
Transport (SAAS/own car)		**Time Activated**	
Time arrived on Scene		**Time Clear of Case**	

Part 3: Patient Details

Patient Name/s:	**DOB(s)**	

Part 3: Clinical details:

Please provide a brief history of the event

RERN CLINICAL RECORD

Appendix Two - Retrieval / Resus Audit

Date	Patient Name	DOB
Clinical Synopsis Presenting Complaint & Key Features		

Procedures performed Any difficulties encountered?	**Action Points**
Clinical Management Did individuals or team identify problems with knowledge, skills or clinical plan?	**Action Points**
Teamwork & Human Factors Any problems with forming an effective team, communication between team members or other 'crisis resource management' issues?	**Action Points**

Equipment Was all necessary equipment available, in working order and were the team able to use it effectively? Was there a need for other equipment identified?	**Action Points**
Referral & Communication Any difficulties encountered in referral, in liaison with retrieval service, handover or in interactions with other agencies (eg: ambulance, police, mental health, etc?	**Action Points**
What ifs Any latent hazards or potential problems identified?	**Action Points**
Positives? What did work well & why	**Action Points**
Negatives? What was difficult & why	**Action Points**
Follow up & Patient Progress? Any problems identified? Discharge plan back to rural?	**Action Points**

Appendix Three - Formulary

Essential items (most commonly used) are in bold

Adenosine Injection (6mg in 2mL)
Adrenaline Injection (1mg in 1mL) (1:1000)
Amiodarone injection (150mg in 3mL)
Aspirin, Soluble/Chewable tab (eg, Disprin direct)
Atropine Injection (0.6mg in 1mL)
Benzylpenicillin Injection 600mg x 4
Cefazolin Injection 1g x 2
Cepacol Lozenges
Co-Phenylcaine Forte – nozzle for spray, short
Co-Phenylcaine Forte Nasal Spray
Dextrose Injection 10%
Droperidol Injection (5mg x 2)
Glucagon Hypo-kit
Glucose 15 Oral Glucose Gel OR, Glucose Solution 75g in 300mL
Glyceryl Trinitrate S/L Spray (Nitrolingual)
Hydrocortisone (Solu-Cortef) Injection 250mg
Ipratropium nebules (Atrovent) 500 microgram
Lignocaine Injection 2% (100mg in 5mL)
Methoxyflurane Inhaler (Penthrane)
Metoclopramide Injection (10mg in 2mL)
Midazolam Injection (5mg in 1mL)
Naloxone Injection (0.4mg in 1mL)
Ondansetron Injection (4mg in 1mL) or sublingual wafers (8mg x 2)
Paracetamol tablets 500mg
Salbutamol MDI inhaler (Ventolin Puffer)
Salbutamol nebules (5mg in 2mL)
Sodium Chloride Infusion 0.9% 500ml x 2
Spacer Device for Ventolin inhaler, foldable
Tranexamic acid (1g in 10ml vial)

Adjuncts

Water ampoules for Injection
Saline ampoules for Injection
Drawing up needles
Luer lock syringes x2 each of 2ml, 5ml, 10ml, 20ml
Mucosal Atomisation Device and intranasal dosing guide

SCHEDULE 8 MEDICATION

Fentanyl Injection (100micrograms in 2mL)
Ketamine Injection (200mg in 2mL)
Morphine Sulphate Injection (15mg in 1mL)

Where the Sandpiper responder is acting in a purely supportive role to augment existing ambulance services, many of these agents may already be available and the list of drugs required may be more limited (eg just carry ketamine, fentanyl, ondansetron) or more specialised. As a general rule, for both equipment and drugs, 'less is more' - carry only that which is needed, don't replicate what is already carried by the ambulance unless extra quantities are anticipated or not available.

Appendix Four - Bag Checklist

ITEM	No.	Expiry date	Check
Main bags			
Catastrophic Haemorrhage Pouch			
SOFT-T tourniquet	TWO		
OLAES bandage	TWO		
QuickClot Gauze	TWO		
Pelvic Binder Pouch			
Prometheus Pelvic Binder (one size fits all) or alternate	ONE		
Femoral Traction Splint			
Slishman femoral traction splint (or alternate eg CT-6)	ONE		
Intravenous Access Pouch			
IVs 14G, 16G, 18G, 20G, 22G, 24G	TWO		
IV bungs	FOUR		
Opsite dressings	FOUR		
Alcohol swabs / chlorhex swabs	EIGHT		
Minimum volume extension line	TWO		
IV Fluids Pouch			
N/ saline 500ml	ONE		
Giving set	TWO		
IV connectors	FOUR		
Intraosseous pouch			
EZ-IO drill & landmarks cheat sheet	ONE		
Paediatric needles	TWO		
Adult needles	TWO		
Large adult needles	TWO		
Luer lock syringe 5ml	ONE		
1% lignocaine	ONE		

ITEM	No.	Expiry date	Check
Dressings Pouch			
Gauze swabs	TWO		
3/0 vicryl	TWO		
1/0 silk	TWO		
Size 10 PenBlade scalpel	ONE		
Betadine skin prep	TWO		
Surgical procedures tray (disposable)	ONE		
Lignocaine 1% w adrenaline 1/100,000	TWO		
10ml syringe	TWO		
21 G needle	TWO		
Hypafix 10cm	TWO		
Bandage 15cm	TWO		
Chest decompression pouch			
ARS needle (or equivalent eg AngioCath)	TWO		
Size 10 scalpel	TWO		
Betadine skin prep	TWO		
Spencer Wells	TWO		
Size 8 surgical gloves	TWO		
Hyfin chest drain seal (or alternate eg Russell seal)	TWO		
Heimlich valve	TWO		
Loose along pack sidewall			
Chest drain 28 Fr	TWO		
PPE pouch			
Gloves, LARGE	FIVE		
Vomit bag	ONE		
N95 mask	TWO		
Disposable gown	ONE		
Sharps container	ONE		
Oxygen C cylinder			
C cylinder	ONE		

ITEM	No.	Expiry date	Check
Bag Mask Pouch			
Pocket BVM	ONE		
PEEP valve	ONE		
Adult NRB mask	ONE		
Adult 3-in-1 mask	ONE		
Paediatric O2 mask	ONE		
Suction Pouch			
Suction Easy bulb suction device	ONE		
DuCanto sucker	TWO		
Airway Adjunct Pouch			
Oropharyngeal airways Size 0-5	ONE		
Nasopharyngeal airways 4 & 6	ONE		
Supraglottic Pouch			
iGel (resuscitation pack) size 0-5	ONE		
Orogastric tubes	ONE		
Sterile lubricant gel	ONE		
Epistaxis Pouch			
Rapid Rhino	TWO		
Cophenylcaine spray	ONE		
MAD (mucosal atomisation device)	TWO		
Fascia Iliaca Block Pouch (OPTIONAL)			
0.75% plain ropivacaine	ONE		
20ml syringe (luer lock)	ONE		
21 G needle	ONE		
Epidural catheter set	ONE		
Indelible skin marker	ONE		
Skin prep	ONE		
FIB cheat sheet	ONE		

ITEM	No.	Expiry date	Check
Loose in side pockets			
Sharpie, trauma shears, headlight, gloves	ONE		
Additional airway bag (OPTIONAL)			
SCRAM Bag (advanced airway) NB not all Sandpiper clinicians may elect to carry this			
Mac 3 & 4 Truphatek Trulite laryngoscopes	TWO		
Intersurgical iView disposable VL	ONE		
Magill forceps	ONE		
Tube ties, tape	ONE		
Frova bougie	ONE		
ETT 5.0-9.0	ONE		
ETCO2	ONE		
HME filter	ONE		
10ml syringe	ONE		
Bite block / gauze / tape	ONE		
SurgiLube	ONE		
CICO kit			
Skin prep	ONE		
Size 10 PenBlade disposable scalpel	ONE		
6.0 ETT	ONE		
Introes Pocket bougie	ONE		
First In kit			
5ml x 2, 10ml x 2, 20ml x 2 Luer lock syringes	TWO		
Saline 10ml	TWO		
Drawing up needles	SIX		
Ketamine 200mg/2ml	FOUR		
Fentanyl 100mcg/2ml	FOUR		
Adrenaline 1/1000	FOUR		
Drug labels & sharpie	MULTIPLE		
MAD (mucosal atomisation device)	TWO		

Appendix Five - The Sandpiper GoodSAM group

The GoodSAMapp is a free smartphone app for iOS, Android & Windows devices. The concept is simple - by using the in-built GPS location capabilities of a smartphone, off-duty CPR-trained clinicians can be notified of an out of hospital cardiac arrest (OOHCA) in their immediate vicinity. The idea is to 'crowd source' help to provide immediate care in the vital minutes before an ambulance arrives. The app originated in the UK and has seen widespread international coverage, with many emergency services incorporating the user database into their tasking systems. The app also includes a database of available defibrillators and allows users to new devices as they come online.

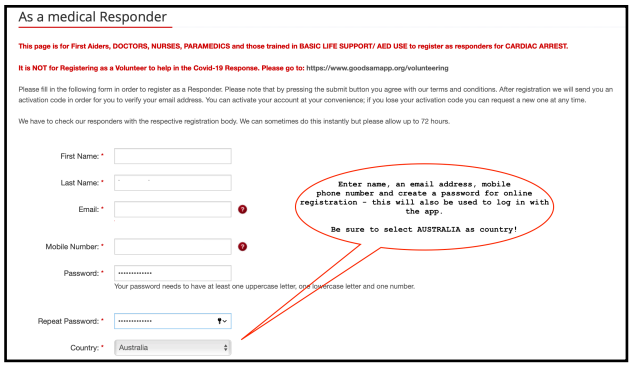
The app exists in two forms - an ALERTER app for the lay public, for use to alert of an emergency (although the app is also triggered by a call to registered emergency services, such as Ambulance Victoria and NZ ambulance). The RESPONDER app is for health professionals.

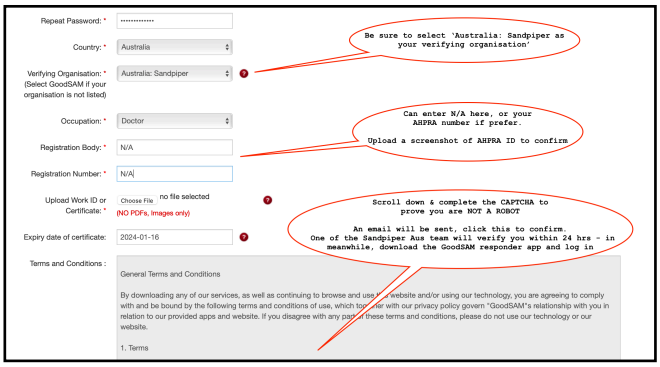
Not only can the device be used to alert to OOHCA, it can also be used to identify nearby personnel and notify them of other incidents - such as trauma, medical emergency or even hazards such as bushfire/ flood etc. Moreover the app contains in-built video-conference and text messaging, which can be used for members to communicate from prehospital scene to base or between individuals.

There is a dedicated SANDPIPER AUSTRALIA group and we would encourage Sandpiper clinicians to sign up. The process is reasonably simple.

(i) register as a GoodSAM responder online via www.goodsamapp.org - use the specific 'Register as a medical responder' tab.

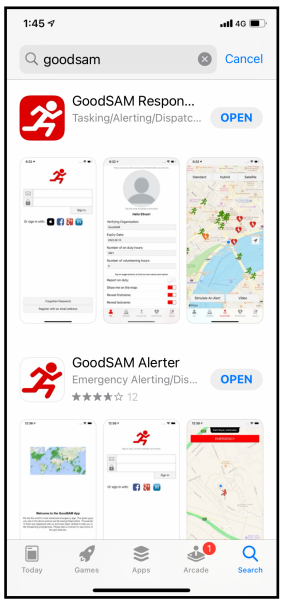
Once this is done, complete the form and be sure to select 'Australia' and then select 'Sandpiper Australia'.





You will need to use an email address, create a unique password and may be asked to upload some form of ID (AHPRA will be ideal). You can enter N/A for verifying organisation etc, but if you provide AHPRA identification then this may facilitate inter-organisational verification at a later date as GoodSAM becomes integrated across more ambulance services.

(ii) once registration is complete, download the GoodSAM RESPONDER app and login using the password and email you generated when creating an account.

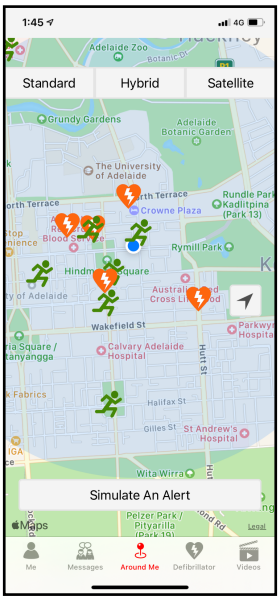


Be sure to select the 'GoodSAM RESPONDER' app

The GoodSAM ALERTER app is for lay public

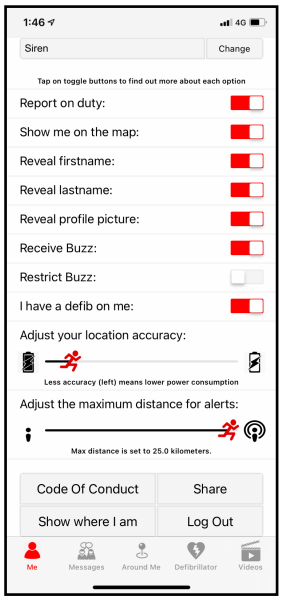
Once downloaded, log in using the email & password you used to register online.

NB : If having difficulties, it may be because your registration details re incorrect OR your registration has not yet been verified. Please email info@sandpiperaustralia.org or goodsam@sandpiperaustralia.org to encourage the Sandpiper admin team into action !



GoodSAM app will show nearby registered responders

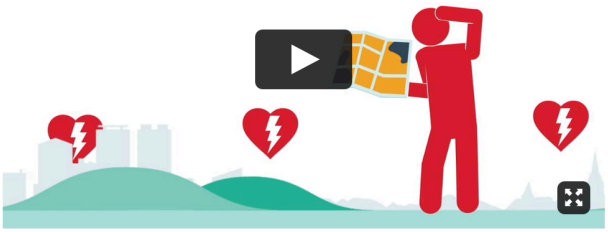
You can adjust alert settings in the 'Me' tab



You can safely leave the app running in background - reducing location accuracy reduces battery drain, which should only be a few percent a month.

As more and more trained groups (ambulance, coastguard, fire, parks etc) become integrated into Australian ambulance emergency activation systems, we anticipate the Sandpiper group will also be recognised as an asset for use, particularly in rural areas. Note the app will be active in any location globally where GoodSAM is already part of emergency responder activation eg UK, NZ, Victoria etc

GoodSAM Defibrillocator!



The World's largest AED Registry now introduces the world's first mobile AED Registry:

The GoodSAM community has mapped thousands of Public Access AEDs. This is done by taking a picture of a fixed location AED (e.g. fixed to a wall) and uploading it through the App. The location of the AED is then checked and appears on our mapping system.

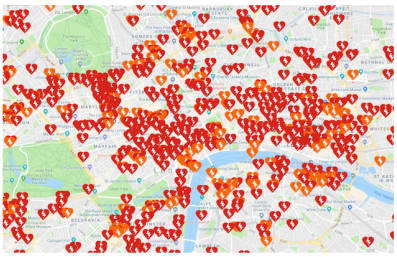
AEDs don't Save Lives - People with AEDs do:

There are many more AEDs out there and we figured that many of these are not fixed, but travelling around in people's cars. In London over 900 police vehicles have AEDs. In some places, taxis carry AEDs and of course many first aid trained people do... and so we have now introduced the world's first mobile AED registry!

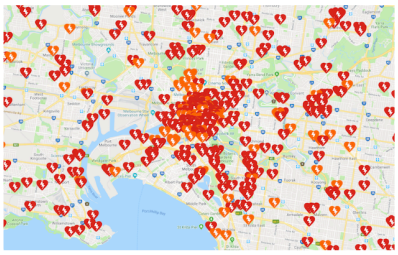
If you carry an AED in your car, simply click "I have an AED" in the GoodSAM responder app and both you and your AED can be used as a resource.

We believe that AED data should belong to the statutory ambulance service and share our data with our ambulance service partners. The data is also open to everyone in a location controlled manner.

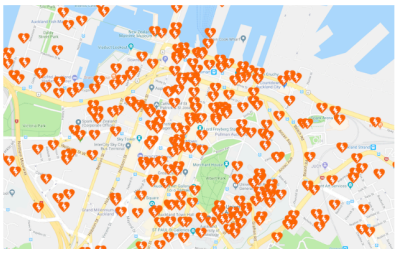
London:



Melbourne:



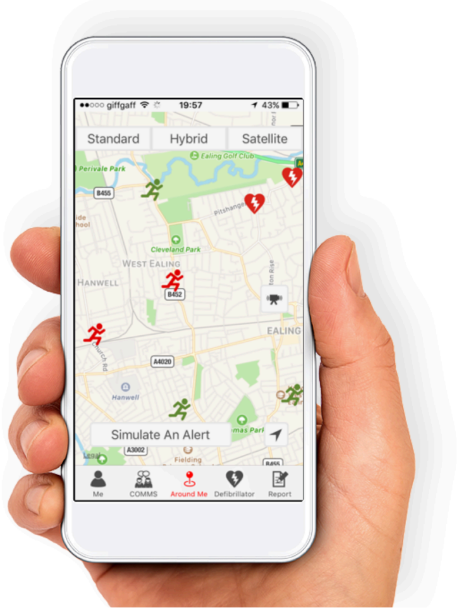
Auckland:



GoodSAM responders exist across the globe (check out the map online) and there is an ever growing database of defibrillators. In the 'defibrilocator' database, which is in turn shared with ambulance services globally for free.

Registering under the SANDPIPER AUSTRALIA GoodSAM group allows agencies such as ambulance to identify your location and potentially notify you once integrated into emergency activation and tasking criteria.

In the meanwhile, registering as a GoodSAM responder will ensure you are notified of cardiac arrests the travelling through locations where GoodSAM is already incorporated into ambulance community responder schemes.



Whose life might you save today?
Calling all responders.

The difference early CPR and defibrillation makes can be crucial - that's where you come in. If you are trained in first aid, download the GoodSAM Responder App today. You'll then be alerted when you are in the immediate vicinity of a cardiac arrest, so that you can start CPR or basic first aid in the critical minutes before the emergency services arrive. The GoodSAM platform is highly governed and secure, with checks to ensure that all Responders are medically qualified. Once verified, you'll join our network of community lifesavers.

Join us: Get the app. Save a life.

sandpiper

saving lives in rural Australia

www.sandpiperaustralia.org