Clinical Focus

Welcome to the first issue of Clinical Focus

This is an internal publication for St John staff containing important clinical updates, and replaces Clinical Matters.

In this edition we discuss some important orthopaedic themes, and touch on some other key concepts such as vecuronium, fentanyl and when to call for help.

If you have specific questions or feedback, please do not hesitate to contact us via email:
clinical.excellence@stjohn.org.nz

Cover: St John and Fire Service personnel work together to extricate a patient with a pelvic injury from a road crash in Templeton.

Contents
3  Left field
4  From the top
5  Emerging evidence
   When to call for help
7  On the radar
8  Craig’s corner
   Some thoughts on vecuronium
9  Great saves
11 Lessons learned
12 Agony aunt
14 Tricks of the trade
16 Compartment syndrome
18 Myth busters
   Oxygen and long-bone fractures
19 Fentanyl - clarifying its use
21 Left field answers
You are called to a 74-year-old male who has been run over by a 4WD reversing out of a driveway. On arrival the patient is lying on his right hand side, complaining of severe pain to his pelvis and left distal femur.

On examination the patient appears pale and extremely uncomfortable. He is orientated and has good recall of events but is agitated. Bystanders state that the patient was not knocked out.

When examining the pelvis the patient screams in agony. He is also complaining of the need to urinate. The patient is extremely uncomfortable when you try to palpate his distal femur. You notice some swelling and deformity in this area. There is no pain or tenderness on palpation of the cervical spine and the patient appears to have no other injuries.

**Observations**
- Pulse 68, regular
- BP 118/90
- \( \text{SpO}_2 \) 96%

**The patient’s medical history**
- Coronary artery disease
- Hypertension
- Early onset dementia
- Chronic bronchitis

**Medications**
- Metoprolol
- Inhibace
- Clopidogrel
- Aspirin
- Simvastatin

---

**Some questions to think about**

1. Are you concerned about the patient’s vital signs? Are there any other important signs to consider?
2. How do the patient’s age, medical history and medications affect his clinical picture and ability to compensate for hypovolaemic shock?
3. What pain relief options do you have?
4. Would you immobilise the cervical spine?
5. How should the pelvis be assessed?
6. How will you splint the pelvis and femur?

**Answers to this clinical case are on page 21**
Exciting times for Clinical Development

These are exciting times for the Clinical Development Team. We finally have all of our team in place, and are in the process of establishing all the processes to support you.

We have had some questions about our structure; here is a summary of how it looks:

**Support:** This area is responsible for providing support and advice to our people at an operational level through our Clinical Coaches. Stefan Wareham (Auckland based) looks after our clinical coaches.

**Education Delivery:** As the name suggests, this part of the team will ensure the delivery of both formal and continuing clinical education to our clinical people via our Clinical Tutors. The role of Clinical Education Delivery Manager is currently vacant, Brett Derecourt is driving this team at present.

**Audit:** Supports our operations members with regard to audit, compliance, complaint investigation and the coordination and administration of the process of issuing and withdrawing authority to practice (ATP). Cheryl des Landes (Napier based) leads our audit team.

**Planning:** The planning team is collectively responsible for clinical curriculum, research, equipment, initiation of new clinical pathways and special projects. Dan Oh (Christchurch based) is at the helm of our planning team.

**Systems:** Our systems team is the backbone of Clinical Development, they do all the admin and behind the scenes work that keeps our other four functions ticking. Brett Derecourt (Auckland Based) is steering our systems team.

If you have any questions or queries regarding our new structure, or anything clinical, please do not hesitate to contact your local Clinical Development representative, or email us at clindevhelp@stjohn.org.nz

**Author:** SUE GULLERY 
**Clinical Manager**
When to call for help

Guidance around appropriate assistance requests
Normally emerging evidence would focus on trends and research from around the world. In this first issue we intend to look at some evidence of our own, that relating to more than one vehicle responding to each incident.

Currently we know that for every incident generated, on average 1.3 vehicles respond. This means that of the some 330,000 incidents we respond to each year, there are around 430,000 St John vehicles sent. For this reason we thought it prudent to provide some guidance around appropriate assistance requests.

**When to call for help**

- You are BLS and your patient is status one or status two and deteriorating
- You are ILS and your patient is status one
- You need a second pair of hands
- Your patient needs a specific intervention that cannot wait until you get to hospital.

Occasionally we have status one patients who are transported under lights by crews that are close to hospital (load and treat en-route approach). Whilst we are not discouraging this, if you suspect your patient is going to arrest, you should call for help in addition to providing rapid transport (unless you can locate hospital before backup could locate you).

**When not to call for help**

- You can get the patient to hospital before backup can locate you
- You require pain relief and you are able to get the patient to hospital within fifteen minutes
- You require anti-emetic, but the patient's vomiting is not inhibiting your ability to treat or transport the patient
- The patient needs IV access only (i.e. there is no actual requirement for other medications)
- The patient is dehydrated but not shocked
- Your patient needs a specific intervention that can wait until you get to hospital (i.e. the patient condition will not be adversely affected by waiting until they are in ED)
- You need a second opinion or are unsure. In this setting your first port of call must be the Clinical Desk within communications.

In addition we have crews who have been calling for ILS assistance when ALS is required, or calling for ALS when ILS would be sufficient. Please familiarise yourself with the scope of practice of ILS and ALS paramedics so that you get the right help. If you are unsure you should request the skill you require.

**When to request ILS support**

- Pain relief (opiates will handle the majority of problems)
- Anti-emetic (same options as ALS)
- Diabetic problems (same options as ALS)
- Asthma or anaphylaxis with good perfusion (IM adrenaline sufficient)
- Septic shock (ILS can manage the majority of these).

**When to request ALS support**

- Cardiac arrest (for airway and post cardiac arrest management)
- Dysrhythmia (bradycardia or tachycardia)
- Seizures (IV midazolam is still the preferred route)
- Asthma or anaphylaxis with poor perfusion (IV adrenaline may be required)
- Airway management or choking (full range of airway management capabilities)
- Complicated problem (ALS have advanced clinical reasoning)
- Entrapments (especially where disentanglement is required).

When attending an incident, if you are unsure about any of the above you should make contact with the Clinical Desk within communications. Otherwise, if you have any questions, feel free to contact us at clinical.excellence@stjohn.org.nz

**AUTHOR:** SUE GULLERY

**CLINICAL MANAGER**
On the Radar

Education

Formal Education

The new National Diploma has been launched! We have had some encouraging feedback from both students and tutors! For those awaiting DVD’s, we expect that these will be in the mail within the next two weeks.

We have started a review of the operations induction, and hope to start releasing new induction modules by the end of the year.

Continuing Clinical Education (CCE)

The latest round of CCE is underway, topics for this round include:

➢ resuscitation
➢ stroke and TBI
➢ diabetes
➢ the right message (patient handover).

ILS and ALS should be aware that there is a pharmacology based OSCE as part of CCE. The OSCE’s are based on the current competencies and knowledge base expected at your level. There is no OSCE for BLS and UBLS this round.

We are in the process of confirming topics for the next round of CCE at the moment. Once we have more information on the next round, we will keep you up to date.

Consumables

Medicine supply interruption

We are still working with our suppliers to resolve problems regarding our supply of Ondansetron 4mg tablets. We acknowledge that some areas may be running short of, or have run out of this medicine. Further updates will be passed on as they come to hand.

We have restored our vecuronium supply lines, and this now should be able to be ordered unhindered through your normal channels.

Pre-filled 10ml saline syringes

Pre-filled syringes should now be making their way into stores and kits nationally. It is important that you understand that these syringes are:

➢ flushes only
➢ single use
➢ not to be used to dilute medication.

The syringes are designed in such a way that you should not draw back on the plunger, as you then introduce the sterile fluid in the syringe to a non-sterile part of the syringe.

AUTHOR: DANIEL OHS
CLINICAL PLANNING MANAGER
Some thoughts on vecuronium

Craig’s corner

With the new Clinical Practice Guideline’s, we introduced a specific bundle of care for patients who have been intubated (and ETT position has been confirmed by electronic capnometry). This is a combination of the neuromuscular blocking drug vecuronium and small bolus doses of morphine and midazolam.

What we are trying to achieve by our post-intubation care is to:

- facilitate ventilation (by eliminating coughing and bucking on the ETT)
- prevent secondary brain injury due to wild fluctuations in carbon dioxide
- avoid the reflex spikes in intracranial pressure (ICP) we see as a consequence of the patient having a plastic ETT down their throat (and from the coughing and bucking that goes with it).

The most common scenario will be that the patient has been intubated during cardiac arrest, achieves ROSC and is then given vecuronium. However, there are a small number of patients who are intubated with an ETT (without RSI) in other situations (e.g. poisoning, hanging without cardiac arrest, drowning without cardiac arrest, TBI with GCS of 3 and ineffective breathing) and these patients should also receive vecuronium and sedation.

Vecuronium is always given in combination with sedation even if the patient appears to be unresponsive. While neuromuscular blockade reduces some of the stimulus for ICP to rise post-intubation it doesn’t reduce it completely and requires adequate sedation as well. It is difficult to tell without access to intracranial pressure monitoring the effects we are having on a patient’s ICP with movement of the patient and manipulations of their airway. We need to assume there is potential for it to have an effect and provide sedation, in addition to neuromuscular blockade to counter that effect.

In a completely unresponsive patient, you would only need to use very small amounts of morphine and midazolam, but the principle that every paralysed patient should also be sedated shouldn’t be lost.

In addition most of the patients we transport post-ROSC are subsequently cooled for 12-24 hours and sedation and neuromuscular blockade form part of that treatment. The neuro-muscular blockade is is required to prevent the body’s natural desire to shiver when it gets cold.

We have received a number of questions from staff in asking if they should have sedated unresponsive patients to whom they have given vecuronium – the answer is yes, for the reasons outlined above.

But does every patient need neuro-muscular blockade and sedation? There is a short answer and a long answer.

The short answer is yes – all intubated patients should receive neuro-muscular blockade (once ETT position is confirmed) and on-going sedation.

The long answer is that neuro-muscular blockade can make assessment in the Emergency Department more complicated, as it is not possible to assess the patient neurologically until the neuromuscular blockade has worn off. For the vast majority of patients this isn’t an issue, but there are always some patients who might recover quickly (e.g. post-ictal) or you otherwise might expect the ETT to be withdrawn in the ED (e.g. elderly post cardiac arrest with deteriorating physiology). For patients in these groups the decision making becomes slightly clouded. It is relatively easy for hospital staff to reverse a single dose in the ED. However it is a reasonable starting point that all intubated patients are sedated and paralysed unless there is a strong indication not to.

AUTHOR: CRAIG ELLIS
MEDICAL ADVISOR

---

CRAIG’S CORNER

8 | CLINICAL FOCUS ISSUE 1

---

![vecuronium bottle](image)

Norcuron®
VECURONIUM BROMIDE 10 mg
Lyophilised powder
for i.v. injection

© Schering-Plough

---
In January a male in his 60’s in Christchurch was fortunate to be only a short distance from help after he was witnessed to collapse by friends. The patient fell to the ground unconscious and was placed in the recovery position.

When Christchurch ALS Paramedic Steve Price received the call he was just 4 minutes away from the scene. On arrival the patient was found to be unconscious, unresponsive, and centrally cyanosed with ineffective agonal respirations.

The primary survey revealed that the airway was obstructed with food and vomit. Steve performed a finger sweep. The airway remained obstructed so with the assistance of a laryngoscope and Magill’s forceps, Steve inspected the patient’s airway and discovered a large piece of sausage lodged in the patient’s glottis & pharynx. Four pieces of sausage were recovered from the airway. With airway positioning, the assistance of an OPA and bag mask, the patient’s respirations began to increase. The patient had good peripheral perfusion, strong pulses and a heart rate of 120 beats per minute.

Shortly after this, ILS Paramedic Campbell Forsyth and BLS Paramedic Dale Dunlop arrived in the responding ambulance. The patient was moved onto a scoop stretcher and was transported to Christchurch Emergency Department. En-route he became combative for a time, continued to improve, and by the time the patient was delivered to hospital, he was sitting up, talking with very little to indicate that just 40 minutes earlier, he was very close to death.

Commentary
This is an example of a great job, not just because of the response time and the outcome, but because of the good clinical decisions made during the incident. There were two notable important decisions made which made this incident run very smoothly.

1. The thorough primary survey that was conducted: Steve rapidly identified the obstructed airway, and took steps to actively remove the obstruction and support breathing.
2. The decision to use airway positioning and an OPA to maintain the patient’s airway: The other options available to the crew were the placement of an LMA or ETT. These are poorer alternatives where the patient has a condition that is very likely to improve, and the airway can be well managed by simpler alternatives – so overall a job well done!
Can you recall what your options are if you respond to a patient with an airway obstruction? The general principles for managing a patient with a foreign body airway obstruction are:

During initial assessment of the unconscious patient, if there is obvious foreign material sighted during airway assessment, the patient should be rolled on their side and officers should use a finger sweep for relieving the foreign body airway obstruction.

**ALS only**

If unable to remove a severe obstruction by the means listed in the algorithm:

- Use a laryngoscope and forceps to try to find and remove the foreign body
- Attempt to intubate by inserting the ETT as far as possible, and then withdraw the ETT back to its normal position. This is designed to push the foreign body down the left or right main stem bronchus so ventilation may be achieved through the other bronchus
- If the obstruction is in the larynx and you cannot remove it then perform a cricothyroidotomy.
Lessons learned

A fully crewed ambulance was sent to a 68 year old female who was undergoing chemotherapy for bowel cancer. She reported 48 hours of excessive diarrhoea and vomiting. She felt tired, washed out and was getting short of breath on minimal exertion around the house. She was assessed by the crew who recommended transport.

The patient was then walked 50 metres up a steep driveway to the ambulance. This resulted in the patient becoming exceedingly short of breath, and needing to stop several times to catch her breath.

Her vital signs were as follows:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR</td>
<td>110</td>
</tr>
<tr>
<td>RR</td>
<td>24</td>
</tr>
<tr>
<td>BP</td>
<td>100/75</td>
</tr>
<tr>
<td>SpO₂</td>
<td>97%</td>
</tr>
</tbody>
</table>

The patient appeared cachexic (weighing 50 kgs). This was documented on the PRF along with her vital signs, and the patient was classified as status two.

The patient subsequently complained and her complaint was upheld.

Case review

› Why was she walked to the ambulance?
› Why didn’t she tell the crew she couldn’t do it?

This is an all too common scenario and one we have addressed previously. This patient should not have walked to the ambulance.

Whilst we acknowledge there are certain groups of patients who clearly do not need to be carried to the ambulance, we continue to be frustrated by complaints about incidents where the PRF makes it obvious that asking the patient to walk to the ambulance was completely inappropriate. We also have had a number of cases which have documented a clear clinical deterioration (even a cardiac arrest) when walking patients an unreasonable distance. Our expectation is that patients who are physiologically unstable will be moved to the ambulance via stretcher or carry chair.

When we spoke to the patient, we asked her why she hadn’t objected at the time. In her response she said she had been in need of our service regularly, and had come across the same crew several times before. She felt intimidated by the crew and was fearful of complaining in case she needed their help in the future.

Please be mindful of your body language and comments around patients. What you consider friendly banter may come across as intimidating and scary – especially if the patient is sick, old and already scared. Feedback like this is uncommon, but we do continue to get complaints with a similar theme.

AUTHOR: CRAIG ELLIS
MEDICAL ADVISOR
Agony Aunt

The guidelines list maximum doses for adult midazolam administration, but not for paediatrics. Is there a maximum dose for paediatric midazolam administration?

No - at ILS level we recommend you administer two of the prescribed doses of IM or IN midazolam, and then consult with the clinical desk, who may refer you to a medical advisor (noting that where available ALS should have been requested when midazolam was administered).

ALS should use their own clinical judgement when determining a safe and sensible dose. We recommend ALS paramedics use the adult maximum dose for a 50kg child. This dose can then be used as the basis for a maximum dose for smaller children by using the principle that a 40 kg child receives a maximum of 80% of this dose and a 30kg child receives a maximum of 60% of this dose etc.

Why has pre-oxygenation been removed from the guidelines for RSI?

Pre-oxygenation is still an important part of RSI, and will continue to be emphasised on the RSI course. The reason it is not specifically listed is that it is part of the technique of RSI, rather than a separate directive in its own right.

I have seen other first responders instruct patients to self administer their own GTN if they have chest pain, is that ok?

No - this is a shortcut we have been seeing more and more frequently. It is ok to allow patients to take their own GTN as per their doctor’s instructions. It is not appropriate to supply the patient with GTN to self-administer, nor is it appropriate to assess the patient and persistently advise them to take GTN according to our guidelines.

The patient self-administering their own GTN should be a signal to the under BLS officer they need to seek assistance. It is also a flag the patient is uncomfortable so should be reassessed.

Why are BLS allowed to use adrenaline for croup but not anaphylaxis?

BLS can use nebulised adrenaline for all causes of stridor or airway swelling including anaphylaxis. Nebulised adrenaline is very safe.

IM adrenaline carries significantly greater risk than nebulised adrenaline, which is why it is reserved for ILS paramedics. Members operating at BLS level or below can administer IM adrenaline for asthma or anaphylaxis provided they consult with the clinical desk first and seek backup.

IV adrenaline carries the greatest level of risk, which is why it is reserved exclusively for ALS paramedics.
The front line

**Rapid response:** This 1979 Christchurch 4wd events vehicle pictured outside Wigram Station did a great job doing frontline work around the foothills during a snowy night last winter.

**St John and Fire Service members work together to extract a status one victim from a motor vehicle crash near Prebbleton.**

**Close shave:** The Christchurch Westpac Helicopter gets into a tight space during a rescue in Kaianga.

Do you have an interesting clinical photo? Do you have a photo depicting St John on the frontline? Worth sharing? Send your photos (along with the circumstances) to clinical.excellence@stjohn.org.nz and we just might publish it – it might even make the cover!

**Rapid response:** This 1979 Christchurch 4wd events vehicle pictured outside Wigram Station did a great job doing frontline work around the foothills during a snowy night last winter.

**Look twice:** Examples of some great training moulage created by Robyn Shuttleworth from Leeston St John.

**Lyttelton and Christchurch vehicles attend a motor vehicle crash near Templeton.**

**Before and after, these file photos show a Sager Traction Splint in action after a motorcyclist and a vehicle collided near Darfield.**

**St John and Fire Service members work together to extract a status one victim from a motor vehicle crash near Prebbleton.**
Tricks of the trade

Locked knee management
1 Fully fold two cardboard splints and pad using wrapped towels. Place one either side of the knee and tie each end firmly using triangular bandages. Then pass another triangular bandage under the bent knee and wrap around the middle of the cardboard splint, tie firmly and you have a splint that supports and holds the knee in a bent position.

Alternative NOF splint
2 An alternate way of supporting a possible fractured NOF involves taking the injured limb and crossing it over the top of the uninjured limb at the point of the ankles. Padding should be provided between the limbs and wide triangular bandages applied to bind the limbs together. This method utilises the uninjured limb as a “buddy splint” and lifting device and provides light longitudinal pressure to assist the femoral head away from the acetabulum.

Malleolar support (foot spat)
3 Traction splint malleolar support broken or in need of a second? Over the affected tibia form a triangular bandage into the shape of an S (as pictured). Pass each end of the triangular bandage under the leg, and feed through the opposing loop. Then tighten as you move into position above the ankle. Bring both ends under the sole of the foot and tie in a reef knot to complete the malleolar support.
KED body splint

A KED would be one of the most underutilised pieces of equipment we carry. As well as its traditional use, a body splint can also be used as a long spinal immobilisation device for paediatric patients, a pelvic wrap and a splint for a fractured femur. **Note:** KED’s should not be used as a body splint if the child has an abnormal airway or abnormal breathing.

Frac strap set

The elastic strap set from a Sager splint can be used as an independent immobilisation tool. It can be used for strapping two legs together, as a sling, or as a pelvic wrap. See if you can come up with other innovative ways to use this device! Always remember to reunite the straps with the rest of your Sager when you are done!

C Collar mask attachment

Noticed the new hooks on the Laerdal Stiffneck Collar? This handy little addition gives you an anchoring point for the straps of an oxygen mask on collared patients when oxygen is indicated.

**AUTHOR:** **STEVE MANN**
**CLINICAL COACH**

Do you have a trick of the trade? Email it to clinical.excellence@stjohn.org.nz and we just might publish it!
Compartment syndrome

Muscle damage

Oedema

Venous flow compromised

Oedema

Capillary flow compromised

Oedema

Arterial flow compromised

Oedema

Ischaemia and tissue death

Oedema

Compartment syndrome is a condition that we rarely come across in the pre-hospital setting, but when we do see it we must recognise it as both a limb and life threatening condition.

Simply defined, compartment syndrome is an increase in pressure inside a muscular compartment. It most commonly occurs in distal limbs (forearm or lower leg) resulting from trauma (box A). Even more rarely compartment syndrome may occur from continuous activity of a particular muscle (for example cycling).

The resulting injury to the muscle causes swelling inside the muscle compartment which increases the pressure. Once the pressure affects the capillary supply to the muscle a vicious cycle begins, whereby oedema will further increase pressure affecting venous drainage, further increasing pressure, and resulting in arterial compromise. The muscle (and eventually the limb) becomes ischaemic, nerve damage occurs, and if untreated, permanent irreversible damage will occur.

Diagnosis

You should consider compartment syndrome in any patient who presents with trauma and the 5 P’s.

- **Pain** will normally be severe and appear out of proportion to the apparent injury
- **Parasthesia** (tingling, burning, pricking, or numbness) - a late sign indicating nerve compression
- **Pallor**
- **Paralysis** - a very late sign
- **Pulselessness** - very late as pressures inside the muscle compartment are normally lower than arterial pressure.

Pain and paraesthesia are the most reliable symptoms. Other signs that may indicate a diagnosis of compartment syndrome may include:

- tight tense looking skin that may have a ‘waxy’ appearance
- oedema (swelling) distal to the injury site due to decreased venous return.

**Traumatic causes:**

- Limb fracture (commonly tibial)
- Haemorrhage
- Burns
- Crush injury
- Prolonged immobility
- IV drug abuse

**Pressure Monitoring System**

Traumatic causes:
Treatment

This is an emergency that if left uncorrected may result in irreversible damage to the limb. Any on-going ischaemia can also be life-threatening, especially when re-perfusion injury occurs.

Our aims should be to:

› load and treat en route (LATER)
› analgesia (pain relief) en-route (ALS may be needed for ketamine as often inhaled analgesia and opiates may not be sufficient)
› transport to a hospital capable of performing emergency surgery where feasible (fasciotomy will be required – this is an incision made into the muscle compartment to relieve pressure)
› notify the receiving hospital en-route.

Author: Blair Andrews
ALS Paramedic

Leg post fasciotomy
**Oxygen and long-bone fractures**

*Myth:* Oxygen should be given to all patients with long-bone fractures, such as femur fractures. Administration of oxygen prophylactically will prevent hypoxia associated with emboli and/or will prevent fat emboli from occurring.

*Evidence:* Fat emboli can occur when fat tissue is mobilised from bones following trauma. This fat tissue can be in small particles or droplets that are able to pass into the bloodstream. When these fat particles are traveling within a blood stream they are called emboli and when they become stuck and lodge within a blood vessel this is called an embolism.

Clinical symptoms that are associated with fat emboli from long bone fractures are rare. However, when clinical manifestations of fat embolism (called fat-embolism syndrome (FES)) do occur they can be serious, or even result in death. Symptoms include:

- respiratory distress
- decreased level of consciousness
- tachycardia.

There is a high frequency of fat emboli associated with long-bone fractures (True!). Fat emboli may occur in greater than 90% of patients with trauma or with long bone fractures. However in most cases the fat emboli are benign (>95% of cases) and therefore in the absence of clinical symptoms there is no reason to pre-emptively treat patients with oxygen.

Therefore the myth that we should treat all long-bone fracture patients pre-emptively with oxygen appears to be **busted**! We were unable to find any evidence in the literature to indicate that pre-emptively giving oxygen could prevent the occurrence of hypoxia or the occurrence of fatty emboli. Chocolate fish to anyone who can find any!

---

**Further reading:**

2. Gupta, B. et al. (2011). Analyzing fat embolism syndrome in trauma patients at AIIMS Apex Trauma Center, New Delhi, India. *Journal of Emergencies, Trauma and Shock, 4*, 337.
Fentanyl - clarifying its use

We have recently introduced fentanyl as a new medication at ILS and ALS level.

We have had some feedback that fentanyl is not great and “doesn’t work” yet at the same time we’ve also had feedback that this is a “wonderful drug and leaves morphine in the dust”. During PRF audit we have also noted quite a lot of fentanyl administration that is not as we intended it to be. In particular we are seeing a number of patients who are receiving both fentanyl and morphine (sometimes alternating) without any obvious clinical indication. We have noted a developing trend of what is being called the ‘morphine chaser’ where a patient in severe pain receives fentanyl and then morphine in quick succession. We think this is illogical and should stop.

Fentanyl is not superior to morphine. Clinically they show a very similar reduction in pain, but they do fill slightly different niches. We are concerned that some staff don’t appear to fully understand its role.

Fentanyl is a synthetic opiate in the same family as morphine. They exert their effects at the same opiate receptors within the brain and spinal cord.

In comparison with morphine its effect comes on slightly more quickly (but also goes away slightly more quickly). It causes less histamine release than morphine - so detrimental blood pressure effects are less common (note: these effects are still possible and care needs to be taken in the elderly and hypovolaemic patients in particular).

Fentanyl is contraindicated in patients who are: less than 2 yrs (not because it doesn’t work, but because of its risk of respiratory depression in that age); unable to obey commands; showing signs of respiratory depression or in premature labour. Its effects are increased by concurrent use of sedating or pain relieving drugs such as other opiates, ketamine or alcohol.

Fentanyl is 100 times more potent than morphine meaning that where you would give a dose of 5 mg of morphine - to achieve a similar effect you would only need to give 50 mcg of fentanyl.

Choosing which opiate to use

Morphine is our preferred opiate unless there is a specific indication for fentanyl.

Fentanyl does not provide better pain relief than morphine, but it is more useful in certain patients. These are predominantly those that require intense pain relief very quickly, intense pain relief for a short period of time, or are children without IV access.

An example of such a patient is one requiring urgent repositioning of an angulated long bone fracture or reduction of a recurrent shoulder dislocation.

Because of its relative cardiovascular stability (primarily due to the fact it causes less histamine release than morphine) it is also useful in patients who are haemodynamically unstable but in significant pain.
It also provides an option for the management of children where intravenous access is not available or difficult to obtain, because it can be administered via the intranasal route. Due to the larger volume of fentanyl required in an adult (even though it isn’t a much bigger volume) it is often very poorly absorbed which is why we don’t currently recommend it in adults.

In general, having started with one opiate, you should continue with the same opiate unless there is a strong clinical indication to move to the other.

"Morphine is our preferred opiate unless there is a specific indication for fentanyl.

Why do some staff feel it doesn’t work?

It’s hard to be sure exactly why some staff have had bad experiences with fentanyl. It may be due to the route of administration – while intranasal is a good route in some patients; significant amounts of the drug can be swallowed or run back out the nose. Large amounts of mucus in the nose can interfere with its absorption. It is for this reason that intravenous administration remains the preferred route for fentanyl and intranasal an acceptable, but inferior alternative.

It may also be due to under dosing the patient – fentanyl is a ‘weight dependent’ drug – 2 mcg/kg initially (if the patient hasn’t had any morphine or ketamine) – so for large children (over 50 kg) our dose range may be leaning towards the lower end of what is required.

We recommend that you gain some experience using intravenous fentanyl at the top end of the dosing range before coming to the conclusion the drug doesn’t work. We think that by gaining experience with using it intravenously, it will give you a better understanding of its strengths and weaknesses prior to using it intra-nasally.

We would also like to take the opportunity to clarify the dilution of fentanyl as some questions in regards to this has arisen:

**Intranasal:** administer undiluted. Draw up half the dose and administer into one nostril, draw up the rest of the dose and administer into the other nostril.

**Intravenous:** draw up 2 mls of fentanyl in a 10 ml syringe, then draw up additional 0.9% NaCl to make a total volume of 10 ml. This will give you 100 mcg in 10 ml, with equates to 10 mcg per ml. Note, in the paediatric drug dose tables in the CPGs, an undiluted volume of fentanyl is described. This was an error – it was always our intention that IV fentanyl would be diluted to 10 mcg per ml.

**Summary**

1. Morphine is the opiate of choice unless fentanyl is specifically indicated.
2. Fentanyl is indicated when:
   - intense pain relief is required very quickly, for example the patient requires urgent relocation of a severely angulated fracture because of distal ischaemia
   - intense pain relief is required for a short period of time, for example the patient has a dislocated shoulder or patella and once relocated the patient is unlikely to be in significant ongoing pain
   - the patient is cardiovascularly unstable, for example they have cardiogenic shock
   - the patient is a child without IV access.
3. Having started with one opiate, continue with that opiate unless there is a strong clinical indication to move to the other.
1. What do you make of the patient’s vital signs? Are these concerning or not?

**Pulse 68, regular:** Because this patient is taking a beta-blocker, they will have reduced stimulation of β1 receptors, meaning it takes longer to become tachycardic in response to shock. Therefore, a normal pulse rate is not a useful measure in determining whether or not he is shocked.

**BP 118/90:** In younger adults, this may be considered a ‘normal’ blood pressure. However in an elderly patient with a history of hypertension, this blood pressure is likely to be far lower than normal. It is possible this patient is in decompensated shock. Note also the narrowed pulse pressure, which is an indicator of vasoconstriction. In this patient this is likely to be secondary to hypovolaemic shock.

**SpO2 96%:** While this is a normal oxygen saturation, the SpO2 probe can only function properly if enough blood passes between the light source and detector. Poor perfusion can result in inaccurate readings.

Always evaluate other indicators of peripheral perfusion including skin colour, skin temperature and capillary refill time. These will deteriorate in response to vasoconstriction (as the patient attempts to increase peripheral resistance) or hypovolaemia (not enough blood volume to reach the peripheral circulation). These are especially important signs in this patient as we cannot rely on an increase in heart rate to indicate the patient is shocked (see comments below relating to beta blockers to learn more).

2. How do the patient’s age, medical history and medications affect his clinical picture and ability to compensate for hypovolaemic shock?

**Age**

In general, elderly people have impaired compensatory mechanisms making them vulnerable to rapid deterioration.

- The elderly are less responsive to sympathetic stimulation during shock
- The elderly have a lower maximum heart rate compared to younger people
- Vasoconstriction is less effective due to arteriosclerosis
- A loss of functional alveoli and decreased tidal volume reduces respiratory compensation during shock.

**Medical history**

Elderly patients with multiple comorbidities (medical conditions) have a higher chance of dying. Here are some examples of why this is:

**Coronary artery disease (CAD):**

CAD impairs the heart’s ability to maintain cardiac output during shock, making the patient vulnerable to hypotension and rapid deterioration. CAD also makes the heart less tolerant of poor perfusion and increases the likelihood of dysrhythmias as shock progresses.

**Hypertension:** As discussed, hypertension can mask a dramatic fall in blood pressure, which means that progression to decompensated shock may be missed.

**Dementia:** Dementia can make it difficult to differentiate between confusion secondary to disease, or due to shock. The best way to assess this is to discuss the patient’s normal presentation with a relative.

**Medications**

Metoprolol is a beta-blocker. Beta-blockers reduce stimulation of β1 (predominantly) and β2 (to a significantly lesser extent) receptors. This makes the patient more vulnerable to hypotension, poor perfusion and rapid deterioration.

Inhibace is an Angiotensin-Converting Enzyme (ACE) inhibitor, which prevents the conversion of angiotensin I to angiotensin II (in the lungs) in the renin-angiotensin pathway. ACE inhibitors reduce peripheral vasoconstriction, affecting a patient’s ability to compensate for blood loss, worsening hypotension.

Clopidogrel is an anti-platelet drug, which inhibits thrombus formation in coronary artery disease. Anti-platelet drugs compound the chance of haemorrhage and make internal bleeding immensely difficult to stop. Because over 3 litres of blood can be lost between a pelvic and femur fracture, patients on anti-platelet medications can deteriorate rapidly!
3. What pain relief options do you have?

**Paracetamol**

Not really. Paracetamol is indicated for mild-moderate pain and will not provide significant analgesia in this situation, even in combination with other forms of pain relief.

**Entonox and methoxyflurane**

Entonox or methoxyflurane (generally either, not both) is a good start and can help provide some analgesia while intravenous access is being obtained and stronger forms of pain relief are being prepared.

Because the elderly generally have lesser tidal volumes than younger people they may struggle to inhale entonox, for this reason methoxyflurane may be a better option in this setting if you have both.

If you practice at BLS level, ILS or ALS should be requested for intravenous pain relief.

**Morphine**

For ILS personnel and above, morphine is a reasonable option, however smaller doses will be required because the patient is haemodynamically unstable. Morphine lowers blood pressure by decreasing peripheral resistance (in arterioles) secondary to histamine release. A further reduction in blood pressure may prove detrimental to this patient who is already poorly perfused.

**Fentanyl**

Fentanyl is the opiate of choice in this case.

As already discussed, this patient is haemodynamically unstable. Fentanyl causes minimal histamine release compared to morphine and therefore less hypotension. Because of this you may find that slightly higher doses of fentanyl can be administered to provide superior pain relief.

**Ketamine**

For ALS personnel, ketamine is an excellent choice as it has a short onset of action and provides powerful analgesia, ideal in cases where patient movement and splinting is necessary. Ketamine also stimulates the sympathetic nervous system, increasing cardiac output and blood pressure. This reduces the risk of further hypotension associated with opiates. Ketamine is used in combination with opiates for best effect.

4. Would you immobilise the cervical spine?

Yes. The cervical spine should be immobilised with a rigid, well-fitted collar.

In this case the mechanism of injury (MOI) is significant. Distracting injuries are also present which may mask the presence of cervical pain.

We should have a high index of suspicion of spinal injury in this patient.

- Most elderly suffer from osteoporosis (a loss of bone density) increasing the risk of vertebral fractures
- Elderly people may have stenosis of the spinal canal, increasing the chance of spinal cord compression
- A loss of the range of movement between vertebrae causes the spine to become rigid. This means that when external force is applied to the spine it is concentrated to a finite area, increasing the chance of fracture and spinal cord injury.

5. How should the pelvis be assessed?

It is not possible to reliably determine whether or not a pelvis is fractured by using clinical examination. The best indicator of pelvic fracture is the presence of pain, but the absence of pain does not rule it out. The pelvis should be presumed to be fractured whenever a suitable mechanism of injury exists.

- Ask the patient about the presence of pain in the pelvic area, including the lower back, groin and hips
- If feasible inspect the pelvis for swelling, bruising or open wounds
- Look for shortening or rotation of both legs.

**Note:** do not ever ‘spring’ the pelvis or apply pressure over the iliac crests. This was taught in the past but we want it to stop. Even if the pelvis is badly fractured, it requires significant force to demonstrate movement and this risks displacing the pelvis further and increasing bleeding.
6. How will you splint the pelvis and femur?

The pelvis should be firmly wrapped using a lifting belt (make sure you recover it later) or sheet. The femur can be splinted by buddy splinting to the uninjured leg. Use of a traction splint is contraindicated in this instance owing to the likely pelvic fracture.

We hope you have enjoyed Clinical Focus. The next issue will be out in December. If you have any comments, questions or suggestions, feel free to contact us at clinical.excellence@stjohn.org.nz
Introducing the Clinical Desk

Who we are:
› Advanced Life Support paramedics

Our role is to:
› support ambulance officers with clinical decisions by giving help and advice with patient management
› support communications centre staff by reviewing jobs and recommending when a change in response or resource level is required
› assist call takers with advice to members of public prior to ambulance arrival.

Clinical staff should call us for:
› out of scope care
› clinical advice
› transport advice (e.g. helicopter transport versus road).

Call 0800 244 111
› 9 for Northern
  4 for Central
  3 for Southern
  – Then select 9 for Clinical Support

Hours
› Northern - 24hours
› Central - 0800-2000hrs
› Southern - 0700-1900hrs