Background
Intrathecal drug pumps are a treatment option for refractory persistent cancer and chronic non-cancer pain and spasticity.

Aims
We describe 4 scenarios to illustrate the clinical management of sudden failure of implanted spinal drug pumps.

Methods
Electronic case note review. Literature Review

Case 1
A patient with persistent post spinal surgery pain had a Medtronic Algomed patient activated drug pump implanted in 1997.

The pump was abandoned a year later in 1998 because of intractable nausea and vomiting with bolus morphine administration in favour of spinal cord stimulator (SCS).

The pump was "reactivated" and refilled with 40mL 0.5% bupivacaine in November 2000 during an exacerbation of back pain.

The pump failed after the chest wall activator button was pressed, due to scar tissue holding the button open. The pump was "reactivated" and refilled with 40mL bupivacaine pressurised. Due to a lack of fluid, the pump reservoir backflow and accumulate as a seroma around the pump.

The pocket appeared swollen, 9mL solution was aspirated backflow and accumulate as a seroma around the pump. On removing the needle blood stained fluid "squirted", like a ‘whale spout’, 10cm above skin. The pocket appeared swollen, 9mL solution was aspirated from the pocket. The patient became sleepy but awakened instantly on stimulation. Ambulance assistance requested. After transfer to hospital another 2mL solution was emptied from pocket and 49mL emptied from pump.

The patient required a GTC infusion to control rebound hypertension, intermittent atropine for extreme bradycardic episodes and naloxone to maintain adequate respiratory rate.

The patient was discharged on Fentanyl TTI 25mcg/h patch without withdrawals. 10 years later remains stable on Duragesic 50mcg/h, pregabalin 150mg bd and duloxetine 60mg/mane.

Treatment consisted of pressure care, IV fluids and emptying the pump! The pump was explanted electively. The exacerbation of back pain resolved after a radiofrequency neurotomy and the patient resumed using SCS.

Case 2
The patient’s second Medtronic Synchromed EL 20mL drug pump stopped suddenly at 12 months with the onset of opioid withdrawal symptoms and hospitalisation.

A side-port contrast study, ‘rotor’ test and telemetry were unremarkable pump refill with clonidine using a 24g Huber point non-coring needle. Inspection of the pump found severe damage to the silicon septum and multiple gouges to the pump due to needle scratching.

Case 3
After emptying 25mL solution from a Medtronic Isomed 60mL spinal drug pump during a routine refill in November 2005, hydromorphone 300 mg, bupivacaine 300 mg and clonidine 24 mg to 60mL was injected into the pump reservoir refill with a Medtronic 24g Huber point non-coring needle.

On removing the needle blood stained fluid “squirted”, like a ‘whale spout’, 10cm above skin. The pocket appeared swollen, 9mL solution was aspirated from the pocket. The patient became sleepy but awakened instantly on stimulation. Ambulance assistance requested. After transfer to hospital another 2mL solution was emptied from pocket and 49mL emptied from pump.

The patient required a GTC infusion to control rebound hypertension, intermittent atropine for extreme bradycardic episodes and naloxone to maintain adequate respiratory rate.

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Treatment consisted of pressure care, IV fluids and emptying the pump! The pump was explanted electively. The exacerbation of back pain resolved after a radiofrequency neurotomy and the patient resumed using SCS.

Case 4
After emptying 9mL solution during a routine refill using a Medtronic 24g non-coring Huber point needle from a Medtronic Isomed 35mL spinal drug pump in September 2015, the patient started complaining of pruritus with mild redness around needle entry as the pump was being refilled with 35mL solution of hydromorphone 200mg, bupivacaine 150mg and midazolam 30mg.

During a syringe change the pump pocket was noted to be swollen and red. 20mL of 25mL injected solution was immediately aspirated from around the pocket and pump emptied. I thought it was a pump failure but needle dislodgement is not excluded.

The patient became unresponsive 10 minutes later and required 0.2mg naloxone to awaken. The pocket became erythematous which I believe allowed rapid drug absorption. Ambulance assistance requested.

The patient was transferred to hospital for overnight observation but required no further naloxone or treatment.

The patient was discharged on 30mg IR morphine tablets bd pm. Scheduled for a trial of occipital nerve stimulation and pump removal or replacement.

Case 5
During a syringe change the pump pocket was noted to be swollen and red. 20mL of 25mL injected solution was immediately aspirated from around the pocket and pump emptied. I thought it was a pump failure but needle dislodgement is not excluded.

The patient became unresponsive 10 minutes later and required 0.2mg naloxone to awaken. The pocket became erythematous which I believe allowed rapid drug absorption. Ambulance assistance requested.

The patient was transferred to hospital for overnight observation but required no further naloxone or treatment.

The patient was discharged on 30mg IR morphine tablets bd pm. Scheduled for a trial of occipital nerve stimulation and pump removal or replacement.

Discussion
Acute pump failure or massive subcutaneous refills outside the pump can create a life threatening situation.

Non-corning Huber point needles reduce but as seen in Case 3, potentially Case 4 and Perruchoud’s case do not always prevent septal damage. Obesity and the seroma fluid around the pump require increased vigilance to prevent misfills.

Early recognition, resuscitation equipment, emergency drugs, planning, assistance and skilled management are needed to avoid a bad outcome.

Lessons
Vigilance and avoiding distraction is necessary during refills to minimise and recognize problems.

Pumps can leak despite non-corning Huber point needles

Basic resuscitation equipment and drugs are needed onsite as problems occur quickly

In the event of a suspected misfill or pump failure empty the pocket & pump ASAP and turn pump off to minimise further drug absorption.

Call for help, according to your local plan to assist with monitoring and treatment.

References and Reprints
Available on request from: mz Taverner@pfcn.vic.gov.au