



ROYAL AUSTRALASIAN
COLLEGE OF SURGEONS

QASM

Queensland Audit of Surgical Mortality



Northern Territory Audit
of Surgical Mortality

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LESSONS from the AUDIT

VOLUME 6



Introduction

The Queensland and Northern Territory Audits of Surgical Mortality (QASM and NTASM) plan to produce *Lessons from the Audit* on three occasions in 2011. This will be a significant increase in work for our staff, but it will be a great return to the Fellows, by providing easy-to-read thoughts about our performance in the past and perhaps stimulate better decision making in the future.

The audits are covered by Qualified Privilege (QP) which protects all Fellows, while allowing publication of data that is de-identified and non-compromising.

Lessons from the Audit will try to make various points about management, systems failure, delays in diagnosis, and delays in treatment. It will also bring to our attention possible changes that we could make in our practices, our departments, or indeed, in our state health care systems. In this volume, we question inappropriate transfers.

We all deal with sharp instruments. We complain about them if they are blunt. The proverb: 'iron sharpens iron' is important for surgeons to remember. We can contribute to each other's learning process. *Lessons from the Audit* will be, in a small way, that 'iron'.

Once again, we must heartily thank our committed staff for their tireless attention to the QASM process and their encouragement of 'this Fellow' to try to achieve more from what is an excellent, when used well, audit process.

I encourage you to be prompt in returning your fully completed surgical case forms and entering them online when you are able. This will make data collection more efficient, and in time, create an excellent tool that will allow us to learn significant lessons.

John North
Clinical Director

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DISCLAIMER: This booklet is produced for Fellows of the Royal Australasian College of Surgeons. Information is obtained under a quality assurance activity. Detail that may identify individuals has been changed, although the clinical scenarios are based on real cases.

Abbreviations

BMI	body mass index
COPD	chronic obstructive pulmonary disease
CPR	cardiopulmonary resuscitation
CRP	C-reactive protein
CT	computed tomography
CTA	computed tomography angiogram
DVT	deep vein thrombosis
ED	emergency department
ECMO	extracorporeal membrane oxygenator
eGFR	estimated glomerular filtration rate
FFP	fresh frozen plasma
GCS	Glasgow Coma Scale
GP	General Practitioner
ICP	intracranial pressure
ICU	intensive care unit
ID	infectious disease
IV	intravenous
MET	medical emergency team
NTASM	Northern Territory Audit of Surgical Mortality
PUJ	pelvi-ureteric junction
QCAT	Queensland Civil and Administrative Tribunal
RFDS	Royal Flying Doctor Service
RN	Registered Nurse
TCC	transitional cell carcinoma
TKR	total knee replacement
WCC	white cell count
QASM	Queensland Audit of Surgical Mortality

(1) Documentation – a simple insurance policy!

An alcoholic with diabetes, schizophrenia, and emphysema was found, with a posterior scalp laceration, lying outside a local convenience store. It was thought that this person had fallen but they could not recall or remember the incident.

The ambulance service attended the scene and found the patient to be Glasgow Coma Scale (GCS) 11. This deteriorated to GCS 9 on arrival at the emergency department (ED).

Shortly after assessment, the left pupil was noted to be fixed and dilated. Intubation and ventilation began, and the patient was transferred for a computed tomography (CT) scan of the brain.

CT confirmed a large, acute on chronic subdural haematoma causing >2cms midline shift and uncal herniation.

A left frontal craniotomy was performed with evacuation of the haematoma and insertion of an intra-cranial pressure (ICP) monitor. There were no major difficulties encountered during surgery. There was a slight improvement in the left pupil with a sluggish reaction post-operatively, but GCS 3 was noted.

The following day, a post-operative CT showed significant improvement in midline shift and uncal herniation, but there was extensive retained haematoma inferiorly with almost complete evacuation superiorly.

However, a new problem had arisen. Hydrocephalus, mainly supratentorial, was present and involved the 4th ventricle. Intracranial pressures remained >20mmHg.

For reasons that are not documented, there was no significant change in management (although the team was clearly notified of intracranial pressures and CT findings). No further surgery was performed and the patient died on day 5 post-operation.

Comment:

The patient's post-operative progress was unsatisfactory. No documentation was present in the medical record to explain why the decision not to operate a second time was taken. The critical importance of documentation cannot be over stated.

The continuation of active treatment in the intensive care unit (ICU) seems futile and without clear documentation as to why, on day 1 post-operation, the decision not to re-operate was taken. The medical records support the possibility that this patient received less than optimal treatment in this circumstance.

Always document the reasons for decisions made. It is impossible, in retrospect, to understand why this course was taken in this instance.

Document, document, document - it's good clinical practice.



(2) Sepsis in the patient with a total joint replacement – BEWARE!

An elderly patient, after a fall two weeks prior, was admitted to hospital because of pain in the shoulders and the left knee. The patient had a high temperature and had suffered rigors.

Five years prior, the patient had undergone a total knee replacement (TKR) for osteoarthritis. The TKR had functioned well.

Poor lower limb skin was noted and multiple breaks in the skin were present on admission. **The diagnosis of septicaemia was made** and intravenous (IV) antibiotics begun. Blood cultures grew *Staphylococcus aureus*. The patient had been admitted to a medical ward and, after four days, it was noted that their left knee was swollen. Orthopaedic consultation was requested.

Aspiration of the joint revealed a purulent fluid and the patient was taken to the operating theatre the following day to have the knee joint washed out. At the time of consent, there appeared to have been some issues as to whether or not the TKR components could be removed at this surgery. It was not until three days later that all the components and cement were removed, and a cement spacer with antibiotic inserted.

Over the next ten days, the patient became confused, developed multi-organ failure, and died. Had the patient been suffering from septic arthritis on admission?

Medical record review confirmed the patient was admitted with shoulder and upper limb pain but documentation of lower limb status was not present. There was no comment noted about knee joints. Was the knee joint the 'silent source' of the sepsis?

Comment:

Beware the aging patient with one or more total joint replacements who becomes febrile and may be septicaemic. This patient may well have had septic arthritis on admission but it remained unrecognised for too long.

With this patient, there was a good case for removal of **all** components at the initial operation. This would have given this patient the best possible chance for the infection to be fully dealt with. Consenting in this case may have been from a junior-level medical officer who did not understand the implications, or who did not truly inform the relatives of the risk and benefit options.

A comprehensive history and examination when this patient was first admitted may have changed the course of this disease. Consultant input earlier may have been prudent. The consenting process should have been more careful and directional.

Infection may arise from lower limb abrasions or lacerations and spread to a joint replacement. Those joints that have been replaced should always be examined for any inflammatory signs, no matter what the symptoms.

More things are missed by not looking than not knowing.

(3) Unrelenting vomiting – unusual cause!

An elderly patient (life-long smoker) who took anti-hypertensive medication was admitted to hospital. Although previous medical history was scant, four years prior an echocardiogram had been performed for vague chest symptoms. The echocardiogram was considered normal.

Two weeks earlier, a General Practitioner (GP) saw the patient who had a four-week history of left-flank discomfort. The GP ordered an ultrasound and CT scan of the abdomen. The latter confirmed a left proximal hydro-nephrosis with soft tissue changes in the region of the pelvi-ureteric (PUJ) but no stones. The GP referred the patient to hospital because of ten days of unrelenting vomiting.

On assessment, moderate ascites was noted with a palpable mass in the left-upper quadrant. The patient was oliguric, had significant hyponatraemia, elevated urea and creatinine, as well as anaemia and thrombocytopenia. There was a 'questionable' 1cm lung nodule in the left-upper lobe.

Vomiting settled with naso-gastric suction but further investigations confirmed ascites and bilateral hydro-nephrosis.

The clinical picture and investigations supported the diagnosis of obstructive uropathy due to advanced retroperitoneal malignancy.

The patient became severely oligouric and the urology team were asked to assess. The

patient was taken to the operating theatre for cystoscopy and ureteric stenting. A low-grade transitional cell carcinoma (TCC) of bladder wall was noted at cystoscopy. The biopsy subsequently confirmed this result. The right ureter was successfully stented, but a PUJ obstruction on the left ureter made stenting it impossible.

Renal function did not improve post-operatively and the patient remained oliguric. Although a radiologist was consulted, the decision was not to proceed to left nephrostomy.

A family conference was called and the decision was made not to actively resuscitate in the event of sudden marked deterioration. Thereafter, the patient was managed palliatively and passed away on day 3 post-operation.

Comment:

This is a classic case of 'acute and progressive' obstructive uropathy. The patient had reached 'tipping point' after weeks of symptoms.

Earlier referral for urological opinion would not have changed the outcome but may have made the patient's last few weeks more comfortable.

Although nephrostomy was considered, it was not undertaken for reasons that remain unclear in the data supplied. It is doubtful if this would have made any difference in any case.

The TCC found in the bladder was an incidental finding and did not relate to the retroperitoneal malignant mass.

(4) Tracheostomy troubles

A middle-aged patient was admitted to the ED with a large haematemesis and melaena. Endoscopy confirmed a large duodenal ulcer with a visible vessel and clot.

The patient had a history of heavy alcohol intake, but it was unclear whether the patient had developed cirrhosis and, if so, to what degree.

After consideration, laparotomy was undertaken and some difficulty was encountered in stopping the arterial bleeding. It was decided to proceed to a Billroth II gastrectomy due to the size of the ulcer and apparent chronicity of same.

Post-operatively, the patient developed a bile leak from the duodenal stump but appropriate drain placement seemed to control the problem.

Due to the continuing gravity of the patient's condition and another co-morbidity, chronic obstructive pulmonary disease (COPD), **a surgical tracheostomy was performed** on day 7 post-operation.

The decision to perform this procedure in ICU, in retrospect, was unwise. The procedure became difficult and the tracheostomy tube was unable to be placed in the trachea to allow adequate ventilation of the patient.

The patient was re-intubated and satisfactory ventilation achieved. Very soon after this, asystole occurred and with cardiopulmonary resuscitation (CPR) for

five minutes, normal rhythm returned. The tracheostomy was then placed successfully and ventilation continued.

Bilateral pneumothoraces were noted and treated after this event. The patient, however, did not return to spontaneous respiration. On day 14 post-operation, after discussions with the family about the diagnosis of severe hypoxic brain injury, treatment was withdrawn and the patient passed away.

Comment:

Complex surgical patients in ICU may need tracheostomy. Should surgical tracheostomy be performed in the operating theatre? Yes, if at all possible. Appropriate staff and surgical assistance is a necessity for good surgical practice.

If difficulties arise, scrub nurses, lighting, suction and diathermy are all available. In this case, senior medical staff were available but it was certainly not an optimal environment in which to operate.

It appears that loss of airway control led to the severe hypoxic brain injury.



(5) Choosing the correct patient

An elderly patient suffering from osteoarthritis in both knees was admitted to hospital for elective surgery. Pre-operative body mass index (BMI) was 37 and this had been a long-standing problem was admitted to hospital. The patient had also been a smoker for many years, but gave up six months prior to the intended surgery. The patient had a number of other limiting and troubling co-morbidities. Almost a decade earlier, the patient had suffered a pulmonary embolus after hernia repair (despite active prophylaxis at that time).

After discussions with the orthopaedic surgeon, the patient was offered bilateral TKR and consented appropriately. Pre-operative work up seems to have been comprehensive from the medical and anaesthetic points of view. Pre-operative physical therapy for lower-limb muscular strengthening and weight reduction, for some reason, seems to have been absent.

The surgical process and post-operative care for this type of surgery were well within standard guidelines.

The problems of mobilising the patient, without doubt, led to more than average venous stasis, and when sudden collapse and cardiac arrest occurred, a pulmonary embolus was thought to be the most likely diagnosis and cause of death.

An autopsy revealed scattered marrow and fat emboli in the pulmonary vessels and

mild emphysema. A dilated cardiomyopathy was thought to be the cause of death. The low haemoglobin was not only due to surgical blood loss but also an unrecognised perinephric haematoma which was probably related to the deep vein thrombosis (DVT) prophylaxis.

Comment:

This patient had a significant medical history and significant co-morbidities. The orthopaedic diagnosis was clear: osteoarthritis in both knees.

The history of DVT was known and although some years ago, occurred despite active prophylaxis. All these facts are clear.

Post-operative pain control was also an issue and despite excellent physical therapy, mobilising became a major hurdle. Post-operative low haemoglobin was to be expected but blood loss should have been recognised and replaced earlier.

What we cannot assess is the level of morbidity caused by the osteoarthritis or by the co-morbidities.

The absence of pre-operative physical therapy also seems very inappropriate.

This patient was on a waiting list for surgery at the public hospital for more than a year. Physiotherapy and/or hydrotherapy can be cost effective in this situation and can become 'pre-habilitation'. Pre-operative assessment and planned weight reduction is most appropriate but seemed to have been forgotten in this patient. Often a mix of these non-operative measures can give substantial improvement in symptoms.

In retrospect, the decision to undertake two TKRs at one session proved to be imprudent. This was an overweight patient with lung damage and other co-morbidities of lesser importance. One TKR was always going to challenge post-operative mobility but bilateral replacement was going to create major problems (and indeed it did). Thinking bilateral TKRs? Think very carefully before offering this option.



(6) Just let me die in peace...

An elderly patient from a remote area was admitted to a small local hospital with severe ischaemic pain in one leg. The patient had been unable to walk for several days due to the pain and had found little relief in their typically high alcohol intake. When neighbours became concerned about this patient's confused mental state they called the GP who admitted the patient to hospital.

A week prior to admission, the right leg pain had begun with no particular injury and was not relieved by rest or elevation. The patient gave a long history of heavy smoking, chronic obstructive pulmonary disease (COPD) and Type II diabetes mellitus that was poorly treated.

On examination, the right foot showed a dusky pallor; popliteal and ankle pulses were not present in the right leg and only a poor popliteal pulse was present on the left side (with absent ankle pulses). Capillary refill was absent in all toes and a small area of dry gangrene was noted on the great toe. There was a global partial sensory deficit below the mid-calf on both sides.

The patient was mildly hypertensive with a tachycardia but afebrile. Leg pain was not relieved by simple analgesics and required narcotic injections on admission and over the first 24 hours. The medical officer, working as a locum in the small local hospital, sought advice from a surgeon in the nearest regional hospital which was more than 1000kms away.

The suggestion of transfer to the regional hospital was not acceptable to this patient who wanted to stay near neighbours for treatment. When the patient became even more confused and febrile, transfer was initiated the following day despite the patient's wishes (discussion with relatives was not possible).

On arrival at the regional hospital, the patient was febrile, semi-comatose, and had a 'dead' leg. When the patient arrived in the ED, unsuccessful attempts were made to contact relatives. The patient arrested shortly after arrival on the ward.

Comment:

Management of the ischaemic limb can be difficult even in the best hospital. Multiple co-morbidities often add to the complexity of treatment in these cases. When the patient clearly has a pulseless limb and is far from a regional hospital, the equation becomes even more complex.

As it turned out, in this case, transfer was too late for any treatment and the patient passed away after complex medical evacuation (that was not inexpensive). Serious discussions with the patient and the relatives (if possible), the QCAT* Officer (if appropriate), along with comprehensive documentation may, in certain circumstances, **avoid unnecessary transfer over long distances when a patient is unlikely to survive.**

In certain circumstances, if death appears inevitable and a second opinion has been sought, there may be a place for 'palliation'.

*(*Note: The Queensland Civil and Administrative Tribunal (QCAT) is available through major hospital switchboards in cases where adults with impaired-decision making capacity require urgent support, or where the treating medical officer also needs support for clinical decision making).*



(7) Not the best way to say “goodbye”...

A teenager was thrown from a car involved in a single-vehicle accident. At the scene, the teenager was GCS 4 with the right pupil dilated.

Nearly two hours after the accident, a small remote hospital received the patient who was intubated and ventilated. Both pupils were fixed.

Transfer to a regional hospital was arranged. During the transfer the patient arrested. After CPR, the patient returned to sinus rhythm. Approximately 6 hours after the accident, the patient arrived at the regional hospital.

Computed tomography (CT) and computed tomography angiogram (CTA) showed extensive skull fractures. Negligible cerebral blood flow was noted.

Given that the pupils had been fixed and dilated for approximately six hours and in view of the CT findings, it was decided that the head injury was not survivable. Surgical intervention was not appropriate. The patient died 12 hours post-accident.

Comment:

Primary medical care and possible surgical intervention were not geographically close. Based on this history and the GCS at the scene, surgery was unlikely to have saved this patient.

With both pupils fixed and dilated, was transfer from the local hospital appropriate?

Clearly, there was some communication with the neurosurgeon on call.

These are always complex situations where collaboration, clear communication, and using every tool available to the primary care medical officer is very important.

In these circumstances, both the treating medical officer and the potential recipient of the patient need to consider carefully all aspects of the case and its transfer when (almost certainly) the patient will not survive.



(8) Multiple systems – multiple obstructions to best patient care?

A middle-aged person had a mitral valve replacement and coronary artery bypass surgery. The patient was discharged to the ward within 24 hours and pacing wires were removed on day 5 post-operation. Immediately following this, the patient became hypotensive and was re-admitted to the ICU.

Echocardiogram showed significant pericardial clot and the patient was returned to the operating room, re-opened, and the tamponade drained. A small hole in the right atrium was found and a small bleeding vessel located and dealt with.

The patient developed multi-organ failure and required inotropes and subsequent tracheostomy with positive pressure ventilation. The patient developed a pleural effusion, acute on chronic renal failure requiring dialysis, ischaemic hepatopathy, enterocolitis, critical illness polyneuropathy and sepsis.

It was decided to transfer the patient to an ICU bed in a second hospital closer to the patient’s home, and this was undertaken despite a raised white cell count (WCC) being noted. Soon after arrival at the ‘new’ ICU, the patient again became haemodynamically unstable and inotropes were once again needed. Multiple sources of sepsis were noted and the left empyema

seemed to be the most significant. This was aspirated and the local surgeon consulted. The surgeon suggested a chest drain and antibiotics. The patient did improve.

However, despite the drain being removed, the patient remained septic. This surgeon suggested a possible video-assisted thoracoscopy, but felt that the primary surgeon should have a significant ‘say’ in the decision making process. The primary surgeon felt that the patient was too weak for one-lung ventilation and asked for CT-guided chest drainage. Unfortunately, this was not available at the second hospital for five days. Transfer to a third hospital was then arranged and the patient underwent thoracotomy and de-cortication of the empyema on day 76 post-operation but continued to deteriorate. The patient died almost a month later as consequence of sepsis.

Comment:

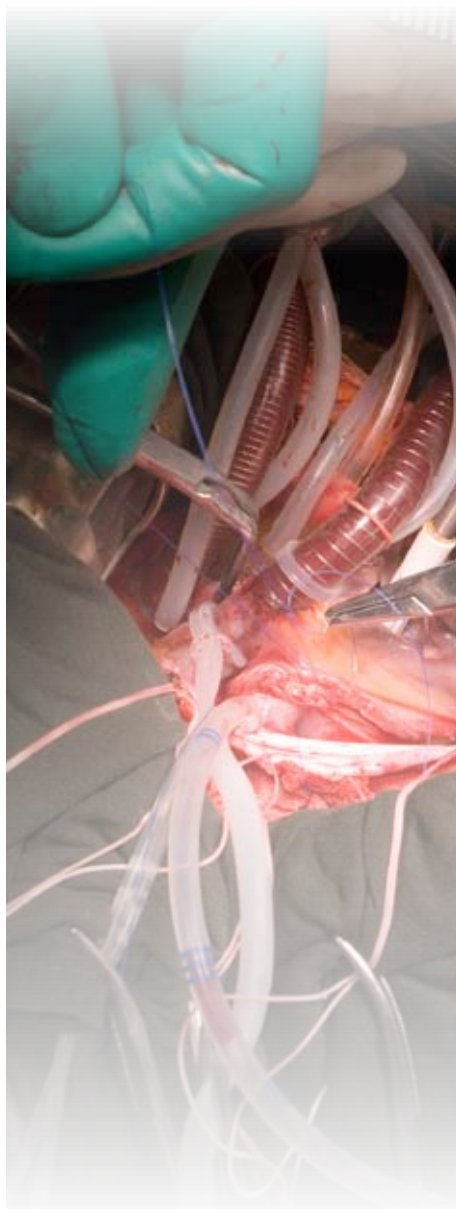
Be careful when transferring a patient who appears to have any impending complications. This patient was not stable and haematology supported a possible serious sepsis. Transfer of ‘patient ownership’ may not be as easy as transfer to another hospital, and it may be potentially life threatening.

Be aware of the potential complications during post-operative care. Pacing wire removal in this case may have been a precursor to the empyema. Should this ‘removal’ process be reviewed?

It appears the CT facilities at the second hospital were not reliable. This did prejudice the outcome of this patient. Always ensure the receiving hospital can manage the patient appropriately. It was clear that the second surgeon was not completely comfortable dealing with the problems that arose after the primary surgeon's operation developed complications. The need to transfer to a third hospital for surgery seems inappropriate but necessary.

If the patient had stayed at the first hospital, then perhaps, better diagnosis and treatment outcomes would have been more likely. In this case, multiple systems broke down, and in retrospect, all of these failures are easily seen.

If this patient was to survive the surgery and the superimposed complications, clinical capability frameworks for each hospital should have been considered much more carefully.



(9) Multi-organ failure... again?

A middle-age patient with significant aorto-iliac atherosclerosis, presented with a history of osteoporosis, gastro-oesophageal reflux, mixed connective tissue disorder, and ischaemic heart disease.

The patient underwent an aorto-bifemoral bypass but it was not clear in the documentation if this was performed for limb salvage or claudication.

Re-operation on day 1 was required due to haemorrhage and coagulopathy with haemodynamic instability resulting. The patient was transfused with 10 units of whole blood, packed cells, FFP and platelets. Several litres of blood were found in the abdomen.

After three days in ICU, the patient was discharged to the ward, and three weeks after the first operation, the patient was discharged from hospital.

A week later, the patient presented to ED feeling unwell. They had a lump in the groin and a fever (WCC was $>20 \times 10^9/L$ and C-reactive protein (CRP) levels were high, over 150 mg/L).

CT confirmed a multiloculated fluid collection in the left groin. Drainage confirmed it to be an infected lymphocele but post-operatively the patient remained febrile despite infectious disease (ID) support and appropriate antibiotics.

The diagnosis of infected graft was made and a non-operative management process was thought appropriate. Despite multiple antibiotics, the patient remained febrile and became oliguric and eGFR of 17mL/minute was recorded with creatinine of $>300 \mu\text{mol/L}$.

A rapid tachycardia led to a medical emergency team (MET) call and again transfer to ICU resulted. Multi-organ failure resulted and the patient died less than a week later.

Comment:

The medical record does not clarify how debilitated this patient was as a consequence of the peripheral vascular disease.

Graft infection is potentially fatal and must be recognised early. It is critical that a patient like this should be encouraged, if unwell, to re-present early to hospital.

A conservative approach for graft infection was appropriate. However, hypotension should have been handled more aggressively.

Deteriorating renal function was a real and major contributor to this patient's final demise. It is highly likely that the mixture of two antibiotics (vancomycin and gentamycin) also played a significant role in the deterioration of this patient. **Always consider antibiotic toxicity and be sure to monitor levels.**

(10) Out of the blue...

A young person collapsed onto concrete and suffered a cardio-respiratory arrest immediately. CPR was initiated by a Registered Nurse (RN) at the scene. This was continued for approximately an hour, when spontaneous circulation returned. When the ambulance service arrived, the patient was hypotensive and hypothermic. Pupils were fixed and dilated. Intubation was undertaken but inotropes were needed to maintain blood pressure at a reasonable level.

On arrival at the neurosurgical unit, CT scan showed extensive subarachnoid haemorrhage around the Circle of Willis extending down to the pre-pontine space surrounding the cord. There was blood in the ventricles and a 6mm left-sided subdural haematoma. A CTA was performed but no obvious aneurysm or malformation was noted. The patient was palliated and declared brain dead the following day.

Comment:

This young person suffered a devastating brain injury. On close inspection of the CTA, the 'fracture' was noted to go into the carotid canal. There was really no place for surgery in this patient. This patient was almost certainly irretrievable.

The RN's commitment at the scene is to be highly commended and enabled transfer to the neurosurgical unit for investigation and potential intervention. The transfer time from the scene to the tertiary referral

hospital seems longer than expected and rotary-wing support may have been considered in this case. It is very unlikely that earlier arrival at the neurosurgical unit would have in any way changed the outcome.

Complex and costly transfer needs careful consultation between a number of parties (especially with the on-call neurosurgeon). Many factors (the weather, the road conditions, the patient's conditions) and all possible outcomes must be weighed carefully against the risks associated with whatever form of medical evacuation is anticipated.



(11) Labelled...and Lost?

An elderly person suffered injuries to the left knee and left ribs, after a fall at home. Surgery was not needed. The patient was treated with analgesia and mobilised with the help of the physiotherapist in the orthopaedic ward. There was no suggestion that medical or nursing staff had any concerns about this patient's progress.

On day 3 post-admission, the patient's general condition caused concern and this led to the junior medical officer asking for a physician assessment: IV fluids were started.

On day 4, a General surgeon saw the patient. Abdominal signs were obvious and plain X-ray showed free gas under the diaphragm.

By that time, the patient was in extremis and resuscitation made no difference. The decision 'not to operate' was made and death followed within a few hours.

The patient clearly had an unrecognised bowel perforation.

Comment:

There was evidence that a reasonable care process was followed.

Junior medical officer assessment on admission to hospital and then in the orthopaedic ward was undertaken. Further medical assessment on day 3 suggested the patient did appear to be 'fine'.

Unfortunately, it appears that the placement of the patient in an orthopaedic bed may

have narrowed, too much, the focus of attention. The patient was clearly a stoical, elderly individual where the intra-abdominal problem was never considered until it was far too late.

Perhaps, when the trauma patient is admitted, daily clinical examination of the 'whole patient' rather than just giving attention to the 'orthopaedic injuries' may recognise non-orthopaedic problems earlier and lead to better outcomes for the patient.





'Iron sharpens iron, so one man sharpens another.'

Proverbs 27:17 (NASB 1995) ©



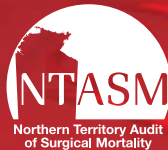
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