Risk Mitigation Strategy
Central Venous Catheter (CVC) Removal

Removal of CVC is a common procedure which can be performed by doctors or nurses. However, it may be complicated by air embolism which is a potentially fatal but entirely preventable complication. Three simple methods should be taken to prevent air from entering the venous system on CVC removal.

Position patient in supine or Trendelenburg position (10-30 degrees head down tilt)

This position elevates the venous pressure above atmospheric pressure, thereby reducing the risk of air embolism.

Valsalva maneuver (forced expiration with mouth closed) or on exhalation during catheter removal

On expiration, jugular venous pressure is greater than atmospheric pressure.

Maintain manual pressure at the cannulation site for at least 5 minutes

Maintain manual pressure at the cannulation site for at least 5 minutes until haemostasis is achieved.

Cover the wound with air tight dressing.

Many important clinical decisions depend on the timely availability of relevant or critical information such as clinical notes, laboratory and radiological examination findings. In clinical practice, the chain of information transfer involves many systems and steps which happen in crisscrossing time frames. Myriad of clinical information has to be picked up by clinicians who are expected to respond with appropriate actions as to diagnose and treat patients. When compared to the scenario of customers picking up their choice of “sushi” in a “revolving sushi bar”, finding critical information in our complex Clinical Information System may sometimes be as difficult as searching for a star in a galaxy. Yet, when clinical incidents occur, one would wonder “why this piece of information was missed?”

Clinical incidents can be caused by delayed response to investigation reports, “reminder” left in the Clinical Management System (CMS) computer, “messages” in the CMS summary etc. None of us would like this to happen to ourselves when we become patients one day. The challenge is to design an information technology (IT) system which can mitigate the problem of “communication breaks” or “vital life and death information missing links”, especially in our current situation of variable practices across different units and departments. To rise to the challenge, the Quality and Safety Teams at the corporate and cluster level will have to further collaborate in order to design an IT system that will take into consideration factors such as ownership and accountability in a public hospital system, staff acceptance, user-friendliness, operational efficiency and relevance of information flow for clinical decision.

A lot of things can happen in the clinical setting without the patients’ awareness until things go wrong. However, for many patients, their main concerns might simply be comfort and dignity in their encounter with the care or service provider. My friend who has recently been admitted to an acute hospital ward sent me a WhatsApp saying that he slept poorly because the night shift staff were talking loudly. I am sure it is also something that we would not wish to experience when we are hospitalized one fine day. After all, clinical information and sleep are just as important to a patient.

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Cluster Chief Executive (Kowloon East Cluster)
Gas Embolism

Air embolism after removal of CVC
- A patient had fracture of right femur and operation was performed.
- Post operative course was complicated by myocardial infarction and a haemodialysis catheter was inserted into the patient for renal replacement therapy in the Intensive Care Unit (ICU).
- The patient’s clinical condition subsequently improved and the care team decided to remove the catheter.
- The CVC was removed by a nurse when the patient was sitting upright on an armchair.
- About 10 minutes later, the patient developed intra-cardiac air embolism requiring resuscitation. The patient’s spontaneous circulation resumed in 4 minutes.
- The patient’s condition further deteriorated after another episode of myocardial infarction. He succumbed 3 days later.

Contributing factors:
1. The nurse was not aware of the risks of intravascular air embolism associated with CVC removal.
2. The nurse did not follow the standard practice of catheter removal.

Recommendations:
1. Promulgate the safe practice of CVC removal by placing the patient in a supine or head down position unless contraindicated.
2. Advocate the safe practice of removing CVC at end inspiratory phase.
3. Review the content of orientation programme, reinforce clinical coaching and evaluate the model for continuous assessment on staff performance and knowledge in care delivery.

Retained Instruments / Material

A segment of nasogastric tube (NG tube)
- A patient was admitted for acute stroke requiring long term NG tube feeding.
- NG tube was repeatedly pulled out by the patient during hospitalization.
- Three months after admission, a chest X-ray revealed 2 radiopaque lines of NG tubes.
- A 18cm NG tube fragment was retrieved from the stomach by oesophageal-gastro-duodenoscopy (OGD).

Contributing factor:
No documentation on checking completeness of removed NG tube as required by cluster policy.

Recommendation:
Develop a system to document integrity of NG tube on removal.
**A Kirschner wire (K-wire) tip**
- K-wires were used for fixation of a patient’s patellar fracture.
- The surgeon cut the K-wire tip without covering the end with gauze to prevent cut end from bouncing off.
- Intraoperative X-ray was performed to confirm the alignment of K-wire. No foreign body was detected.
- Post operative X-ray showed a 0.5mm metallic foreign body outside joint space of the patient’s knee.
- The patient preferred no further operation.

**Contributing factors:**
1. The surgeon was not aware of the safe practice of covering K-wire end with gauze before cutting.
2. The surgeon could not detect the presence of foreign body on intraoperative imaging.

**Recommendations:**
1. Promulgate the good practice of covering the K-wire end with gauze before cutting.
2. Enhance alertness of surgeons on retained foreign body while reviewing intraoperative imaging.
3. Explore the possibility of providing routine intraoperative X-ray screening before wound closure.

**A segment of redivac drain**
- Cemented surgery was performed on right foot for a patient with traumatic fracture. A redivac drain was inserted.
- Two days after operation, the surgeon decided to remove the drain.
- Nurses removed the drain at bedside but encountered resistance.
- During checking, the drain end was found cut at side hole level.
- Nurses presumed the drain was trimmed intentionally during operation.
- Two weeks later, a doctor detected a segment of drain retained in patient’s right foot while reviewing X-ray.
- The drain was removed during the next operation and was found adhered tightly to the cement.

**Contributing factors:**
1. The cement was not set before drain placement.
2. The nurse was not aware of the increased risk of broken drain when encountering difficulty on drain removal.
3. The nurse did not recognize the drain was likely broken given that the drain was cut at side hole level.

**Recommendations:**
1. Ensure the cement is set before drain placement and confirm the mobility of drain before wound closure.
2. Promulgate the safe practice on drain management.
A guide wire

- A patient was diagnosed with acute pancreatitis and shock. The doctor decided to insert a CVC.
- While opening the first CVC set, the guide wire accidentally dropped onto the floor. The nurse therefore opened another set of CVC. Two CVC sets were used simultaneously during the procedure.
- No counting of guide wire was performed before the end of procedure.
- Resistance encountered during flushing of main CVC lumen.
- Backflow of blood could not be detected from main lumen.
- The drip was therefore connected to the side CVC lumen which was patent.
- Post procedure X-ray confirmed retained guide wire which was retrieved at bedside uneventfully.

Contributing factors:

1. Guide wires were not counted before the end of procedure.
2. Two CVC sets were used simultaneously which might cause confusion.
3. The doctor and nurses were inexperienced in CVC insertion procedure and its aftercare.

Recommendations:

1. Incorporate a critical checking step before end of procedure to ensure counting and checking of guide wire.
2. Revise the safety procedure checklist to remind staff to count guide wire used.
3. Reinforce the practice of using only one CVC set at a time.
4. Organize training programmes to doctors and nurses on CVC insertion procedure and its aftercare.

Inpatient Suicide

In 2Q 2016, a total of 5 inpatients (4 male and 1 female aged between 35 and 72) committed suicide.

Of the 5 inpatients, two had psychiatric illness and 3 had underlying malignancy.

Two inpatients were on home leave. They both committed suicide by jumping from height.

For the other three inpatients, two were found jumping from height. The remaining one was found missing in ward and hanging in public area. The following is an outline of one of the inpatient suicide cases:

Distribution of inpatient suicide in 2Q 2016

- 1 missing
- 2 home leave
- 2 inpatient
Jumping within hospital compound
- A schizophrenic patient was admitted to a general ward for decreased general condition.
- Clinical condition improved after treatment and the patient was transferred to a convalescent hospital for arranging hostel placement.
- The patient was assessed by psychiatrist and was found to be mentally stable with no suicidal risk identified.
- Two months later, the patient was planned for discharge. The patient’s discharge was withheld due to medical reason.
- On the same night, the patient entered the roof top of the hospital building through an emergency exit and jumped from height.

**Contributing factors:**
1. Defects in the design of emergency exit gate in preventing access to the roof.
2. Failure of the emergency exit’s audio alarm system.
3. Inadequate height of fence rail at the roof.

**Recommendations:**
1. Consider to install a security lock at exit gate to keep access closed except in emergency situations.
2. Restrict access to the roof via the passenger lift.
3. Repair / upgrade the security alarm system and ensure regular preventive maintenance is in place.
4. Perform an environmental scanning on suicidal risk.

Serious Untoward Events

Of the 31 SUE cases reported in Q2 2016, 29 were medication error and 2 were patient misidentification. The medication error cases involved giving known drug allergens (KDA) to patients (14), dangerous drug (6), anticoagulant (5), antiplatelet (1), inotrope (1), oral hypoglycaemic agent (1) and others (1).

Of the 14 KDA cases, 3 developed mild symptoms which subsided after treatment. The others had no allergic reaction.
Medication Error

**Distribution of drugs related to KDA**

<table>
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<th>Q4 2015</th>
<th>Q1 2016</th>
<th>Q2 2016</th>
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<tr>
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<td>1</td>
<td>5</td>
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<tr>
<td>NSAID</td>
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<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Paracetamol</td>
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<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Others</td>
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<td>2</td>
<td>7</td>
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<table>
<thead>
<tr>
<th>Known Allergy</th>
<th>Allergen Prescribed</th>
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<tr>
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<td>Cephazolin</td>
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<tr>
<td>Paracetamol (3)</td>
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<tr>
<td>Ketorolac</td>
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<tr>
<td>Aspirin</td>
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<tr>
<td>Maxolon</td>
<td>Maxolon</td>
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<tr>
<td>Tramadol (2)</td>
<td>Tramadol (2)</td>
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<tr>
<td>MES</td>
<td>Benadryl Expectorant</td>
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**Case 1**
- Patient with known allergy to Arcoxia was admitted to hospital with pseudo ID.
- The pseudo ID was assigned as the patient had forgotten to bring the ID card.
- Doctor was not aware of the patient’s allergy history, and prescribed Ketorolac.
- Nurse did not know that Arcoxia is a NSAID and administered Ketorolac (ward stock item) to patient.
- The patient did not suffer any allergic reaction.

**Case 2**
- Patient had known allergy to Ammonia and Ipecacuana Mixture (MES).
- Doctor prescribed Benadryl Expectorant for management of patient’s upper respiratory tract symptoms.
- Doctor and nurse were not aware of the cross sensitivity between Benadryl and MES, both containing ammonium salt.
- Benadryl (ward stock item) was administered to the patient.
- The patient did not show any symptoms.
Patient Misidentification

Mislabelling and mixing up the specimen of lung biopsies

Patient A had CT-guided biopsy of lung lesion in radiology department

Patient A's tissue was put into a new specimen bottle

Patient developed cardiac arrest and was transferred to ICU, escorted by nurse C

Nurse C put the specimen bottle on the bench of the CT suite

The CT suite was cleared up for preparation of next procedure

Nurse D took out a “new” specimen bottle from the drawer of the bench (which had Patient A’s tissue in it)

Patient B performed CT-guided lung biopsy

Doctor put the biopsy needle into the “new” specimen bottle and believed sufficient tissue sample was collected

The specimen bottle was affixed with the label of Patient B

Nurse C returned from ICU but could not locate Patient A’s specimen bottle

Only the specimen bottle of Patient B was received by the laboratory

DNA testing confirmed only Patient A’s DNA was found inside Patient B’s specimen

Contributing factors:
1. Workflow for specimen and specimen bottle handling was suboptimal.
2. Role delineation and responsibilities during emergency situation were not clearly defined.
3. The specimen bottle was not tamper proof sealed.

Recommendations:
1. Review workflow to ensure uniformity of specimen and specimen bottle handling.
2. Handle specimens by radiographer during emergency situation.
3. Adopt tamper proof seal on specimen bottles.