Victorian Institute of Forensic Medicine

Clinical Communiqué

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CONTENTS

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Next Edition: March 2017

EDITORIAL

Welcome to the final issue for 2016. In this issue we look at three cases where medication errors contributed to the cause of death. There is extensive literature available on the types of medications errors, their prevalence, and the hard work that has been done so far to reduce this substantial cause of adverse events in healthcare settings. The Australian Commission on Safety and Quality in Healthcare identified the importance of improving the safety and quality of medication usage in Australia, and listed it as a National Safety and Quality Health Service Standard (NSQHS Standard 4).

All medicines can be toxic if given incorrectly, however, there are some routinely prescribed and administered medicines that if used in error, are more likely to cause catastrophic patient harm. These medications can be summarised by the acronym 'A PINCH': Anti-infective agents, Potassium, Insulin, Narcotics, Chemotherapeutic agents, Heparin and other anticoagulants. They generally have in common a narrow therapeutic window of action, and pose a serious potential problem when administered via the incorrect route, or in the setting of significant co-morbidities. The cases in this issue demonstrate frequently prescribed medications from three of the high risk categories listed in the acronym above.

Medication safety was the original concept for this issue. The cases soon revealed though, another equally important and related theme around the dilemmas of not-for-resuscitation (NFR) orders in the setting of medication misadventures. This led us to ask ourselves – why do such errors occur? And then, to consider further: should a pre-existing NFR order be overturned and a Code Blue be called when an iatrogenic event is suspected? under what circumstances would it be appropriate not to resuscitate a patient in the setting of an iatrogenic event? and, are there any specific steps or additional decisions and actions that should take place regarding resuscitation following an iatrogenic event?

We are very privileged to have two expert commentaries in this issue to tackle the questions raised. Dr Elizabeth Roughead provides an insightful analysis on slip-lapse and hierarchical errors, and Associate Professor Mark Boughey addresses the complex issues surrounding NFR orders. We also welcome back case précis authors, Dr Angela Sungaila, and Dr Sanjeev Gaya, from Clinical Forensic Medicine at the Victorian Institute of Forensic Medicine.

Finally, as we look forward to 2017, and reflect on the issues and cases that we have explored so far, we take this opportunity to acknowledge all the contributors to the Clinical Communiqué. Our sincerest thanks go to the busy clinicians who authored the case summaries and the expert commentaries, offering their valuable time and knowledge. It is due to their work, and their commitment to the impact of education to improve patient safety, that we have now published ten issues of the Clinical Communiqué with cases, themes and lessons that resonate with us all.

ACKNOWLEDGEMENTS

This initiative has been made possible by collaboration with the Department of Forensic Medicine (DFM), Monash University, Victorian Institute of Forensic Medicine (VIFM) and Victorian Managed Insurance Authority (VMIA).

FEEDBACK

The editorial team is keen to receive feedback about this communication especially in relation to changes in clinical practice. Please email your comments, questions and suggestions to: cc@vifmcommuniques.org

CASE #1 A TOXIC TIMELINE

Case Number:
20/14 WA

Case Précis Author:
Dr Nicola Cunningham
B.Med, MForensMed, FFCFM (RCPA), FACEM

CLINICAL SUMMARY

Mr L was a slightly built 66 year old male who travelled to Australia to visit family members and celebrate the birth of his grandchild. He had a past medical history of ischaemic heart disease and arthritis for which he routinely bought medication from a local market in his hometown. During his stay in Australia, he ran out of his arthritis medication and become troubled by stiff and sore joints in his hands and feet. He attended the local hospital and was referred to a nearby medical clinic for assessment.

Dr H obtained a medical history and prescribed methotrexate for Mr L, at a dose of 5mg daily for 5 days, followed by 10mg daily for 7 days.

At the clinic, Mr L was seen by Dr H, a locum general practitioner (GP) who had trained overseas and had been practising in Australia for two years. Mr L's daughter accompanied him as an interpreter. Dr H obtained a medical history and prescribed methotrexate for Mr L, at a dose of 5mg daily for 5 days, followed by 10mg daily for 7 days. Dr H also prescribed regular anti-inflammatory medications and an intra-muscular dose of a corticosteroid. Dr H provided a handwritten note to the family for the benefit of Mr L's treating doctor once he returned home. The note stated:

methotrexate (10mg) Preventer
start with 1⁄2 tablet once a day
do this for 5 days then
1 tablet once a day x 1 week
may need to increase twice a day
= check kidneys -> 1/12
Full blood exams

When Mr L's family dropped the prescription at a local pharmacy, there was a delay in having the prescription filled. The family then showed the handwritten note to the pharmacy staff, after which the methotrexate was dispensed as prescribed.

Mr L was admitted to the local hospital where he was found to have pancytopaenia (simultaneous reduction in red blood cells, white blood cells and platelets) and evolving septicaemia.

The label on the bottle read, "*No directions specified please check with prescriber if unsure of usage.*" The dispensing pharmacist handed the family an information printout about methotrexate and explained that the normal dosage was weekly, not daily.

Mr L started the methotrexate as prescribed and initially experienced an improvement in his symptoms. He soon developed stomach pains, vomiting and excessive urination however, and returned to the same GP who diagnosed him with a urinary tract infection.

He was commenced on antibiotics and anti-nausea medications but his symptoms worsened and he developed diarrhoea and mouth ulcers. He stopped taking the methotrexate. Nine days after the onset of his gastrointestinal symptoms, Mr L was admitted to the local hospital where he was found to have pancytopaenia (simultaneous reduction in red blood cells, white blood cells and platelets) and evolving septicaemia. He also had impaired renal function, coagulopathy, and a low albumin level. By that time, he had taken 5mg methotrexate daily over 4 days. X-rays revealed a staghorn calculus in the right kidney, small bowel obstruction, and an apical lesion in his lung presumed to be due to a prior TB infection. He was diagnosed with methotrexate poisoning and transferred to a major metropolitan hospital for ongoing management.

Mr L suffered a protracted and stormy course over the next few months in hospital with multiple admissions to the intensive care unit (ICU).

Although his blood cell counts returned to normal, he developed gastrointestinal bleeding, sepsis, deteriorating kidney function, and reactivation of tuberculosis. He underwent a laparotomy and several gastroscopies, and eventually had his right kidney removed. He died in hospital four months after starting the new course of methotrexate.

PATHOLOGY

A post-mortem examination was conducted by a forensic pathologist. Cause of death was listed as multiple organ failure associated with the combined effects of complications of methotrexate toxicity, vasculitis (aetiology unknown) and atherosclerotic cardiovascular disease.

INVESTIGATION

There were two main issues addressed at inquest. The first was to clarify what role, if any, the methotrexate played in the cause of death, and the second was to identify the responsibilities of prescribing doctors and dispensing pharmacists in the setting of a medication discrepancy.

The dispensing pharmacist gave evidence that she was aware the methotrexate should have been prescribed weekly, but she could not recall ringing the GP to clarify the dose, and could not explain why she proceeded to dispense the medication in the manner that she had.

The coroner heard that methotrexate is an immunosuppressive medication used in the treatment of rheumatoid arthritis and as a chemotherapy agent in some cancers. It is generally dosed at a range of 10mg to 20mg weekly and adjusted for size of the patient. Toxic effects of methotrexate include bone marrow suppression and liver toxicity, so close monitoring with baseline tests including full blood count, kidney and liver function tests are recommended.

Records showed that Mr L was reviewed by a rheumatologist during his hospital stay, who determined that his underlying arthritis had been due to polyarticular tophaceous gout, not rheumatoid arthritis. This diagnosis was confirmed at post-mortem.

At inquest, the GP openly admitted the error in prescribing methotrexate for Mr L's arthritis and for prescribing it at the incorrect dose and failing to perform preliminary blood tests. She apologised to Mr L's family and provided the coroner with details of retraining that she had subsequently completed.

The dispensing pharmacist gave evidence that she was aware the methotrexate should have been prescribed weekly, but she could not recall ringing the GP to clarify the dose, and could not explain why she proceeded to dispense the medication in the manner that she had.

The final cause of death by multiple organ failure could not be directly linked to methotrexate as Mr L's chronic medical conditions, combined with the complications of sepsis and vasculitis, left the timeline unclear.

Expert testimony was heard from a consultant physician who considered that the role of methotrexate in this case was difficult to establish as the direct cause of death was multi-factorial. He suggested that the cumulative dose of 20mg over four days would not be expected to lead to nausea and vomiting but the underlying renal impairment meant the dose was effectively higher.

The forensic pathologist gave evidence that the contribution of methotrexate to death was obscure despite the initial hospital admission being due to the medication. The final cause of death by multiple organ failure could not be directly linked to methotrexate as Mr L's chronic medical conditions, combined with the complications of sepsis and vasculitis, left the timeline unclear.

CORONER'S FINDINGS

The coroner was not able to find to a sufficient level of satisfaction that the methotrexate prescription caused the death by way of accident or misadventure, nor was he satisfied that the death arose from natural causes. The coroner therefore made an open finding as to how the death occurred.

The coroner stated that the care provided by the GP in prescribing the methotrexate fell below the standard expected, and that the medication error had been identified, but not effectively corrected by the pharmacist.

The matter was referred to the Australian Health Practitioner Regulatory Agency.

In conclusion, the coroner remarked:

It is a terrible irony that the deceased had come to Australia from a much less affluent society where he received apparently informal but effective treatment for a painful, but not life-threatening, condition. He was convinced to place his trust in modern western medical treatment, and the provision of that treatment not only failed him, it probably precipitated his death.

RESOURCES

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Hilmer S. Strategies to reduce medication errors. *Medicine Today* 2016; 17(7): 44-50. Available at: http://medicinetoday.com.au/sites/default/files/cpd/MT2016-07-044-HILMER.pdf

KEYWORDS

Medication error, methotrexate, pharmacy, prescription, drug toxicity, general practitioner

CASE #2 KNOWING WHERE THE END LIES

Case Number:

2/2013 SA

Case Précis Author:
Dr Angela Sungaila
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CLINICAL SUMMARY

Mrs P was 72 years old when she died in a private hospital. Eight years prior to her death she had been diagnosed with cancer of the salivary gland. Unfortunately, during the year of her death she was found to have multiple metastases. Her admission to her community hospital was precipitated by a fall with a resultant pathological fracture of her pelvis and intractable pain. She was transferred to a private hospital for ongoing pain management.

Initial analgesic treatment was subcutaneous hydromorphone and midazolam with amitriptyline at night. Mrs P became confused on this regimen so Dr M arranged for an intrathecal catheter to be inserted.

Mrs P's oncologist, Dr S, was of the opinion that she had incurable disease. She would not be able to tolerate any further chemotherapy because of her fragile state. The aim of treatment would be to manage her pain which was severe and exacerbated by any movement. The extent and severity of her illness was discussed with Mrs P and her family.

Dr S referred Mrs P to Dr M, a palliative care physician who agreed that her life expectancy was limited and there would be no prospect of further curative treatment or rehabilitation at that stage. Discussions took place with Mrs P and her family about a care plan and the need for a hospice.

Initial analgesic treatment was subcutaneous hydromorphone and midazolam with amitriptyline at night. Mrs P became confused on this regimen so Dr M arranged for an intrathecal catheter to be inserted. Treatment via the intrathecal line was with bupivacaine which caused Mrs P to develop right leg weakness, so the intrathecal infusion was reduced and then stopped.

The portal was left in place in case there was a later need for spinal administration. The question of rehabilitation was reconsidered but that unit would not admit patients with either intrathecal or epidural portal analgesia.

The previous regimen of subcutaneous hydromorphone, midazolam and amitriptyline was reinstituted. Several days later, on the day of her death, Dr M considered that for optimal pain relief the intrathecal route of analgesia should be restarted. In his notes he warned that the 'intrathecal' portal should be treated with optimal aseptic technique. However, when Dr M wrote the order for the drugs later in the day, he ordered 5mg morphine and 3ml bupivacaine to be given twice daily and referred to the portal as 'epidural' rather than 'intrathecal'.

A bolus dose of the prescribed medication was given by a nurse at 10:10 hours that day. Thirty-five minutes later, Mrs P was found to be unresponsive. The hospital MET team were called and they administered an intravenous dose of naloxone. Despite an initial apparent improvement in her condition, Mrs P became unresponsive again shortly after. Normal saline was given intravenously, and a naloxone infusion was commenced but she remained unresponsive. The MET team consulted with Dr S over the phone, who indicated that resuscitation was not appropriate with respect to her malignant disease, and that it would prolong her death rather than save her life.

With the assistance of an opinion by a pain management specialist regarding the dose of intrathecal medications and the concentrations found at autopsy, the pathologist found that the cause of death was intrathecal toxicity of bupivacaine and morphine.

Mrs P was therefore not treated with other resuscitative measures and died four hours later.

PATHOLOGY

At autopsy, the pathologist noted the extent of Mrs P's metastatic disease, however he could not find a clear anatomical cause for her death. With the assistance of an opinion by a pain management specialist regarding the dose of intrathecal medications and the concentrations found at autopsy, the pathologist found that the cause of death was intrathecal toxicity of bupivacaine and morphine.

INVESTIGATION

The focus of the coroner's investigation was principally to determine the circumstances in which Mrs P was given an excessive dose of intrathecal medication. The coroner also considered whether the extent of treatment given following Mrs P's terminal collapse was reasonable. He examined the basis for the NFR order given by Dr S to the MET team and the opinion that resuscitation in this case would have been '*prolonging death*'.

Dr M immediately acknowledged that the dose he ordered was excessive if used via the intrathecal route.

Written and oral testimony were provided by the hospital staff involved. To assist the investigation, the coroner also received reports from two pain management specialists. Dr M immediately acknowledged that the dose he ordered was excessive if used via the intrathecal route. With respect to resuscitation following the apparent intrathecal morphine/bupivacaine overdose, Dr S explained that he took the background of her illness into account when deciding on the extent of treatment. He described Mrs P to be, at the time of her final admission, a '*woman who was dying and in a great deal of pain*'.

The coroner examined the question of whether the nurse administering the intrathecal injection should have known that the dose was excessive. He heard from the expert witnesses that the dose of bupivacaine might be appropriate to achieve anaesthesia in surgical settings, where haemodynamic status can be carefully monitored by staff with anaesthetic expertise.

The coroner also found that there was uncertainty about the NFR order in relation to its application following Mrs P's collapse.

In ward settings, nursing expertise in spinal anaesthesia might be expected in dedicated pain management units, but not necessarily in other clinical environments.

CORONER'S FINDINGS

The coroner found that Mrs P died as a result of the intrathecal injection of an excessive dose of morphine and bupivacaine. He differentiated this situation from that which might exist in s17 of the *Consent to Medical Treatment and Palliative Care Act 1995 (SA)*; which provides that medical treatment given as palliation to someone who is dying and, which might contribute to their death, should not be regarded as an intervening cause of death. Therefore, in this case the recognition that the medication dose given was excessive to Mrs P's needs, precluded the exclusion of it as a cause of death.

The coroner found the nurse was not in a position to query or second guess Dr M's order for the dose or modality of administration of the medication.

The coroner also found that there was uncertainty about the NFR order in relation to its application following Mrs P's collapse. He acknowledged Dr S's dilemma in making the decision and found that it would not have been possible to foresee and discuss the unlikely medication mishap prior to Mrs P's death. The coroner stated that family members should take part in the end of life discussions if their loved one has a sudden unexpected deterioration.

The coroner did not make a finding in respect of management of Mrs P's final collapse. He took into account an opinion by the pain management specialist that even if resuscitation had been undertaken to its fullest extent, there was no guarantee that it would have been successful.

In making recommendations the coroner discussed the problematic issue that there was not a clear way of identifying whether a portal beneath the skin was for intrathecal or epidural use. In acknowledging that both Dr M and the administering nurse had known that it was an intrathecal line, the coroner did not recommend a particular action that would prevent this error in the future. He recommended that the hospital advise all clinicians to monitor a patient's vital signs closely if they are given medication via the intrathecal route.

AUTHOR'S COMMENTS

Neuraxial administration has become an efficient way of delivering analgesia for severe pain in the postoperative and palliative situations. Intrathecal catheters deliver medication to the subarachnoid space, where cerebral spinal fluid (CSF) flows around the spinal cord. This is in contrast to epidural catheters where the tip rests in the epidural space, which is external to the membranes that contain the CSF. An important distinction between the two is that significantly less medication is required when an intrathecal line is utilised.

If the scope of a NFR order is determined and communicated to the treating team, a decision in the case of an unexpected mishap may be easier to make.

A NFR order should be recorded in a patient's record in an unambiguous manner. It cannot hope to encompass unforeseen misadventure but in a general way should include a statement of the scope of the directive. The dilemma in Mrs P's final hours highlights the need for a clear understanding of how a patient may want to spend the last period of their life.

If the scope of a NFR order is determined and communicated to the treating team, a decision in the case of an unexpected mishap may be easier to make.

Even so, family engagement is a crucial part of the final decision making process.

RESOURCES

Sultan P, Gutierrez MC. Neuraxial morphine and respiratory depression. *Drugs* 2011; 71(14): 1807-19.

Cavell R. Not-for-resuscitation orders: the medical, legal and ethical rationale behind letting patients die. *Journal of Law and Medicine* 2008; 16(2): 305-34.

KEYWORDS

Medication error, intrathecal dose, morphine, bupivacaine, NFR, pain management

CASE #3 TRUMPING AN ORDER

Case Number:
COR 2011 003564 VIC

Case Précis Author:
Dr Sanjeev Gaya
MBBS, DMJ(Clin.), MForensMed, FFCFM (RCPA)

CLINICAL SUMMARY

Mrs C was a 69-year-old female with a complex medical history of stroke with a residual hemiparesis and ongoing risk of aspiration, atrial fibrillation, and insulin-dependent diabetes mellitus. She was more recently diagnosed with base of skull osteomyelitis with ear involvement and a suspected left ear tumour. Mrs C had a planned admission to a metropolitan hospital for a biopsy and debridement of a malignant otitis externa.

The post-biopsy and debridement period was stormy. Mrs C was commenced on oral antibiotics (ciprofloxacin) after the biopsy results suggested an infection. One day after the procedure, her oxygen saturation levels dropped and staff suspected she had aspirated. A nasogastric tube (NGT) was inserted but was pulled out by Mrs C a day later. Despite advice from healthcare professionals about the risk of further aspiration and sub-optimal oral nutrition, neither Mrs C nor her immediate family would acquiesce to the reinsertion of a NGT.

Three days later, following another episode where Mrs C's oxygen saturation levels dropped, radiological and electrocardiographic investigations showed acute pulmonary oedema with right lower lobe consolidation and rapid atrial fibrillation.

After reviewing Mrs C's condition, taking into account her past medical history, and consulting with her family, the ICU doctors formed the view that she was 'not for resuscitation' (NFR)

For these reasons, Mrs C was transferred to the Intensive Care Unit (ICU), where a NGT was re-inserted. After reviewing Mrs C's condition, taking into account her past medical history, and consulting with her family, the ICU doctors formed the view that she was 'not for resuscitation' (NFR).

Specifically, an order was completed that detailed Mrs C was "*not for CPR, intubation, ventilation…not for inotropes, or return to ICU*". She was also "*not for code blue, but [was to have] full ward management, call primary team and/or ICU liaison*".

Mrs C was returned to the ward, where the nurse-in-charge (NIC) during handover alerted colleagues to Mrs C's NFR status. The NIC also left instructions that Mrs C's oral ciprofloxacin ought to be crushed and administered through the NGT tube. Later that same evening, blood tests were required, and the nursing staff realised that Mrs C's evening medications, including the ciprofloxacin and intravenous frusemide, had not yet been administered.

An autopsy demonstrated refractile foreign material in the vessels of the brain, lungs and heart, consistent with intravenous administration of an oral drug.

The nurse looking after Mrs C (RN. R) was asked to take the bloods via a peripherally inserted central catheter (PICC), and to administer the medications. As she had not had prior experience of PICC lines, she was supervised by a third nurse (RN. C). RN. R was instructed to crush the ciprofloxacin to enable NGT administration, but then drew the paste into a standard sized non-luer lock syringe even though she intended to administer the medication via the NGT, which required a larger nozzle. RN. C drew up the frusemide and both medications were placed into a kidney dish. At the bedside, RN. R took blood from the PICC line, and administered the intravenous frusemide. The NIC was present at the time, attending to Mrs C's NGT feeding. The NIC informed RN. R that medications administered via a PICC needed to be drawn up in a 20ml luer lock syringe. RN. R returned to the drug room and transferred the crushed up ciprofloxacin into a luer lock syringe, injecting it into the PICC line.

A short time later, Mrs C became cyanosed and hypoxaemic, then unresponsive. Since Mrs C was subject to a NFR order, a code blue was not called. She was pronounced deceased soon after.

PATHOLOGY

An autopsy demonstrated refractile foreign material in the vessels of the brain, lungs and heart, consistent with intravenous administration of an oral drug.

Autopsy findings also confirmed macroscopic and microscopic evidence of emphysema and aspiration pneumonia.

Toxicological analysis of post-mortem samples confirmed therapeutic levels of medications. A negative tryptase level ruled out anaphylaxis as a cause of death.

INVESTIGATION

Looking primarily at the circumstances in which Mrs C had died, the coroner at inquest focussed specifically on:

- The incorrect administration of oral medication via the PICC line;
- The making of the NFR order;
- The status of a NFR order in the event of an iatrogenic event;
- The adequacy of remedial measures taken by the health service to minimise the risk of such errors in drug administration.

The Director of Medical Services gave evidence that a number of measures had been implemented by the hospital following an investigation using Root Cause Analysis.

The coroner noted at inquest that to her credit, RN. R had realised the administration error almost immediately after Mrs C died, and had made full disclosures to the hospital staff and in the medical records.

These included using amber oral and nasogastric dispensers (that could not be physically connected to intravenous lines) for all medications given via the enteral feeding tube route. New measures also ensured that nurses who had not completed PICC e-learning packages were not allocated to caring for patients with PICC lines.

The coroner reviewed the health service's NFR procedure, and an independent expert witness provided testimony on the importance of ongoing communication with families about NFR orders.

The coroner noted at inquest that to her credit, RN. R had realised the administration error almost immediately after Mrs C died, and had made full disclosures to the hospital staff and in the medical records.

CORONER'S FINDINGS

The coroner concluded that Mrs C died as a result of an inadvertent intravenous administration of oral ciprofloxacin in the setting of aspiration pneumonia, emphysema, and osteomyelitis with indirect contribution from cerebrovascular disease, diabetes mellitus and coronary artery atherosclerosis.

The coroner found that the healthcare professionals were justified in stipulating a NFR order, and that discussion had ensued with the family about NFR status. The coroner found that intravenous injection of oral ciprofloxacin was a simple human error that caused an irreversible iatrogenic event and that the fatal outcome would not have changed with CPR.

Commenting on whether staff should have called a Code Blue, the coroner found that the decision not to call one was made in good faith in accordance with the NFR order, because staff had not immediately recognised that a medication administration error had caused the acute deterioration. However, she recommended that irrespective of a NFR order, a Code Blue should be called if an iatrogenic event is recognised so that a medical assessment could be made as to the nature of the iatrogenic event, and whether it was amenable to treatment. Finally, the coroner found that the health service in question had taken comprehensive remedial actions such that the error occurring in the future had been minimised and patient safety enhanced.

RESOURCES

Standard 4 Medication Safety Learning Module. Department of Health and Human Services Victoria. December 2014. Available at: https://www2.health.vic.gov.au/about/publications/policiesandguidelines/nsqhs-online-learning-st4-medication-safety.

KEYWORDS

Medication error, ciprofloxacin, nasogastric tube, NFR, wrong route, nursing

EXPERT COMMENTARY A SLIP, A LAPSE AND THE ROLE OF HIERARCHY IN MEDICATION ERROR

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A slip of an action or a lapse of memory are two types of error to which we are all vulnerable. Slip-lapse errors are considered skill-based or execution errors.[1] These usually occur during performance of routine tasks where our attention is diverted. Typically, slip-lapse errors affect familiar tasks we have successfully completed many times before.

As the cases in this edition highlight, these errors may result in catastrophic consequences. In the case of Mrs C this type of error occurred twice. The first error is during the routine task of drawing up medicine for administration. There is a slip. The medicine is drawn up in a non-luer lock syringe. What was intended was to draw the medicine up in a wider nozzle syringe suitable for nasogastric administration.

The second error occurs at the time of medication administration. This slip occurs because multiple events are happening; blood is being taken, the PICC line is being cleansed, and another medicine is being correctly administered via the PICC line. These events interrupt the time and processes between the medicine being prepared and its administration. This second slip involves the right action, administering the medicine, but occurs on the wrong object, that is administration via the PICC line. This is compounded by a memory lapse. The senior nurse reminds the less experienced nurse that a luer-lock syringe is required for the PICC line, despite previously advising on the need to crush that medicine for administration via the nasogastric tube. Given the number of concurrent tasks being completed it becomes understandable that a person would forget that this medicine is not intended for the PICC line.

In the case of Mrs P, a similar skill-based error occurs. The prescribing physician is aware that the line is located in the intrathecal space.

However, a memory lapse results in the ordering of an epidural dosage of analgesia rather than the intended intrathecal dosage.

We are all vulnerable to slip-lapse errors. Systems solutions are required to reduce the risk of their occurrence and to minimise harm. Examples include syringes of a different colour for nasogastric administration, or redesigning the shapes of syringes so they are specific to actions and make it impossible to connect mismatching components.

Educational or disciplinary interventions are not successful in addressing errors of this type. As the example with Mrs C shows, systems solutions are also needed to address workflow issues so that interruptions or distractions are minimised.

The other theme that runs through all the cases is the place and role of authority in contributing to error occurrence, also known as hierarchical errors.[2] There was the pharmacist, who was aware there was a potential problem with the prescription of methotrexate, but did not appear to have sufficient autonomy to stop provision of the medicine or to challenge the medical practitioner. Next, we see a nurse deliver an incorrect bolus dose of a medicine via the intrathecal line as prescribed by the medical consultant. Finally, we see a nurse change a syringe to one suitable for a PICC line based upon advice from a more experienced nurse, despite the intention to deliver the medicine via a NGT.

Hierarchical errors and how to mitigate these are better described in the aviation industry. There, safety is recognised as the responsibility of all members of the team. Each member has a role in error identification and understands that safety takes priority above deference to position.[3] The research on the role of hierarchical errors in health care is sparse.

Strategies to address these issues include the use of checklists, cross checks, read-backs, graded assertiveness and rules that support the ability to challenge our senior colleagues.[3]

Communication and teamwork are at the heart of these techniques. Systems solutions, while necessary to avoid slip-lapse errors, need to be complemented with efforts to address issues of teamwork and communication. Collectively these approaches will help us to minimise medication errors and consequent avoidable deaths.

RESOURCES

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2. Calhoun AW, Boone MC, Porter MB, Miller KH. Using simulation to address hierarchy-related errors in medical practice. *The Permanente Journal*. 2014; 18(2): 14-20.

3. Kapur N, Parand A, Soukup T, Reader T, Sevdalis N. Aviation and healthcare: a comparative review with implications for patient safety. *JRSM open*. 2016; 7(1): 2054270415616548.

For further information on air safety lessons and the use of checklists, refer to: Future Leaders Communiqué Volume 1, Issue 1, October 2016. ISSN 2207 – 0451. Available at: http://www.vifmcommuniques.org.

EXPERT COMMENTARY NFR CHALLENGES AND CHANGES

Associate Professor Mark Boughey
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St Vincent's Hospital Melbourne
MBBS, B.MedSc, FAChPM, FRACGP, Dip Pall Med, MPH

Decisions surrounding a patient's cardiopulmonary resuscitation (CPR) status are a normal part of clinical practice. These decisions are complex and context specific, requiring sophisticated clinical and ethical analysis to implement and appraise. How best to consider, communicate, document and enact these decisions remains challenging in healthcare and this accounts for significant variability in application. Education, training, and communication skills are all necessary to have a therapeutically effective process that brings convergence of patient, family and health care professional's expectations. Unfortunately, patients, families and clinical staff continue to misinterpret a 'not for resuscitation' (NFR) order as one that means 'do not provide any active treatment'. This misinterpretation can lead to many of the difficulties and conflicts surrounding what is considered 'best care' at times of patient deterioration and clinical uncertainty.

Responding to these challenges and researched practice, two significant processes of healthcare redesign are currently occurring.

First, the 'NFR process' has evolved to become the more comprehensive Goals of Care (GOC) planning process for each admission a patient has to hospital. Second, is the introduction of a patient-determined Advance Care Plan or Advance Care Directive (ACP/D), which aims to more broadly capture the values, beliefs and wishes of a patient. The ACP/D is helping to better inform significant discussions and influence outcomes in decision-making about CPR and NFR.

The Goals of Care Plan introduces two determinations within its clinical considerations and documentation. First is an assessment of suitability 'for CPR' or 'no CPR', which would prompt a 'Code Blue' for full patient resuscitation. Second is a formulation of the ongoing care at the bedside when a 'Code Blue' call is no longer deemed appropriate. This care may range from: the urgent immediate escalation of care under a 'Medical Emergency Treatment' (MET) call to; a more considered escalation after a treating unit medical review, to; ward based care without escalation and possible palliation, or; a focus on the care needs of an actively dying person.

METs are called at a time of significant clinical deterioration to assist patients and support staff in gaining an immediate medical assessment. They are called to determine if the current situation is amenable to reversible treatment, to settle patient distress and symptoms as quickly as possible and, decide whether the specified level of resuscitation at ward level is appropriate. As this process has become more familiar, it is clear that both a 'not for CPR' order & significant care escalation can coexist, rather than believing that one precludes the other.

Even with a focus on palliative intent or care of the dying, MET calls may still be required. Examples include severe, acutely escalating pain crisis, an unanticipated sudden major airways obstruction or unpredicted seizure activity developing into status epilepticus. In these situations, a palliative care physician would advise a MET response to garner immediate action to better manage patient distress and burden of symptoms.

In the context of an iatrogenic medication event, hospital guidelines should reflect the more recent changes to the code blue/MET processes. For most situations, if an iatrogenic event is recognised in a patient with a pre-existing 'not for CPR' order, a default urgent MET assessment should be called.

It is the analysis of the clinical situation at the time of the MET assessment that will determine the level of response required for resuscitation and monitoring. This analysis will also inform the decision as to whether care remains ward-based or precipitates a reversal of a 'not for CPR' order to move to the Intensive Care Unit.

Clinically, in a situation such as an opioid overdose, palliative care patients require the same considerations as any other patient, particularly if the anticipated illness trajectory still sees time ahead. However, the significance of the impact of ACP/Ds, and the need to act in respect of the patient's wishes, are increasingly critical. This is especially important in the anticipated last few days of life, where comfort care remains the focus without any escalation. After the MET assessment, if death is the likely outcome of the iatrogenic event, forewarning a family of the coronial processes is important. Referral of the patient and family to palliative care services is also an important step that needs to occur as part of standard MET care.

The ongoing challenge in healthcare, more broadly, continues to be the improvement in the training of doctors to effectively consider and develop GOCs, integrate ACP/Ds and to successfully communicate the operationalisation of those plans to clinical staff, families and patients. Such actions will significantly improve the management and consistency of patient care with more effective family understanding when an iatrogenic medication event occurs.

RESOURCES

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