

IN THE CORONERS COURT
OF VICTORIA
AT MELBOURNE

Court Reference: COR 2009 1679

FINDING INTO DEATH WITH INQUEST

Form 37 Rule 60(1)

Section 67 of the Coroners Act 2008

Inquest into the Death of: RUBEN CHAND

Delivered On: 16 July 2012

Delivered At: Coroners Court of Victoria
Level 11, 222 Exhibition Street
Melbourne

Hearing Dates: 1, 2 and 3 May 2012

Findings of: K. M. W. PARKINSON, CORONER

Representation: Mr S. Cash appeared on behalf of Dr J. Vetro;
Dr P. Halley appeared on behalf of Alfred Health;
Mr R. Harper appeared on behalf of Kiran Chand and
family.

Police Coronial Support Unit Senior Constable K. Ramsey

I, K. M. W. PARKINSON, Coroner having investigated the death of RUBEN CHAND

AND having held an inquest in relation to this death on 1, 2 AND 3 May 2012

at Melbourne

find that the identity of the deceased was RUBEN CHAND

born on 17 October 1966

and the death occurred 22 March 2009

at The Alfred Hospital, 55 Commercial Road, Melbourne, Victoria 3004

from:

- 1a. HYPOXIC ENCEPHALOPATHY
- 1b. RECENT ACUTE MYOCARDIAL INFARCTION WITH CORONARY ARTERY BYPASS GRAFTS

in the following circumstances:

1. On 7 March 2009, Mr Ruben Chand went into cardiac arrest in the ambulance bay of the Royal Melbourne Hospital ('RMH'). He was resuscitated in the emergency department and intubated and then underwent coronary artery bypass surgery. Post surgery he was admitted to the Intensive Care Unit (ICU), however his condition continued to deteriorate.
2. It was determined that Mr Chand was requiring of more intensive cardiac care and transfer to the Alfred Hospital was arranged for extra corporeal membrane oxygenation therapy ('ECMO'). Mr Chand was transferred on 8 March 2009. He was admitted with cardiogenic shock complicating Coronary Artery Bypass grafts for Acute Myocardial Infarction.
3. Medical clinicians involved in the care of Mr Chand at the Alfred Hospital ICU were Consultant Intensive Care Specialists Dr Jason McClure and Dr Andrew Ross, Senior Resident, Senior Registrar Dr Joseph Vetro and Junior Registrar Dr Cameron Knott. Nursing clinicians were Intensive Care Nurse Donna Edwards and Clinical Nurse Specialist Amelia Phillips.
4. Nurse Edwards reports that on 13 March 2009 she was nursing Mr Chand. She provides a comprehensive report of his condition prior to extubation.

“He was sedated with propofol 150mg per hour for agitation and compliance with his endotracheal tube. He was also receiving 1mg per hour of morphine. Upon neurological assessment he opened his eyes in response to his name but was unable to obey commands and he was moving all of his limbs in a spontaneous manner and thrashing about. He withdrew from the stimulus of pain and his pupils were equal and reactive to light. CVS was haemodynamically stable with a mean arterial pressure of greater than 70mmHg, and sinus rhythm. Adrenaline was ceased and he remained on noradrenaline. His CVP was +14 and he had a low grade temperature of 37.5C. He was peripherally warm and perfused and had slight oedema. His respiratory status had equal air entry to right and left lungs but with decreased bases. He was on minimal ventilation and his arterial blood gas was stable. He was on hourly suction which yielded purulent sputum and a cough on deep suction. Intercostal catheter remained off suction, draining haemoserous fluid. A proposal to remove the intercostal catheter was deferred as a result.”¹

5. On 13 March 2009, a decision was made by Dr McClure for trial of extubation as Mr Chand was on minimal cardio respiratory support, that he was apparently stable, that he was agitated by the endotracheal tube and based upon a belief that he had been communicating or responding to his family. Dr McClure’s evidence was that he made this decision on balancing a number of factors and conscious that there may be a need for reintubation and that he expected that if the need arose, he would be advised and would attend the procedure.
6. Dr McClure’s evidence was that he had no knowledge that Mr Chand had been a difficult intubation at the Royal Melbourne Hospital and that had he been aware of this when he made the decision to extubate, he may have delayed for another day until he was absolutely confident that Mr Chand was obeying commands. He stated that he may have made different preparations on the extubation, including ensuring he was himself present and had a plan for re-intubation if required. (T23.18)
7. Nurse Edwards states that she queried the decision to extubate Mr Chand with Dr Knott because her observation had been that his best neurological response was opening his eyes to his name and withdrawing from pain. She stated that he did not obey commands and was moving his limbs spontaneously. Dr Knott confirmed that the extubation would take place.

¹ Exhibit 8 - Statement dated 8 March 2012 and Exhibit 9 - Inpatient notes dated 13 March 2009.

8. Nurse Edwards states that at extubation, undertaken by herself with Nurse Phillips, the end tidal CO₂ monitor or capnograph² at the bed was in use and working. After extubation it was turned to respiratory from CO₂. She reports that after extubation all ventilation equipment including the end tidal machine remained connected and moved to the side. She observed that over the next 50 minutes the patient became agitated and appeared cerebrally irritated. She noted that an arterial blood gas reading at 1230 hours was PaO₂ of 53 and ideally should be greater than 80mmHg. She notified the intensive care senior registrar and Dr Knott and Dr Vetro determined to re-intubate. The decision to re-intubate was not notified to the consultant, Dr McClure.
9. The initial re-intubation was attempted by Dr Knott who states that whilst he had a view he was unable to pass the ETT, Dr Vetro took over. Dr Vetro stated that it was difficult to obtain a clear view of the airway and he had what he would describe variously as a Grade 2B and a Grade 3 view. Dr Vetro's evidence was that he called for a bougie³ to assist in passing the ETT. Dr Vetro states that he was handed an introducer instead of the bougie.
10. It appears that that the bougie was available on the resuscitation trolley and that error or misunderstanding was the reason why it was not either passed to or utilised by Dr Vetro. He did not ask again for a bougie. He continued with the procedure, without the use of a bougie and during this time, there was no intermittent manual oxygenation of the patient undertaken. Dr McClure's evidence was that in practical terms there was little difference between the degree of difficulty associated with a Grade 2B or Grade 3 view and that each was difficult and warranted use of a bougie because it significantly increases the likelihood of a successful intubation⁴.
11. The ETT was passed with difficulty. Capnography, was not available to confirm the placement of the ETT. Dr Vetro's evidence was that the tube was observed to mist and he believed that he observed chest rise suggesting correct placement of the tube. Shortly afterwards Mr Chand went into cardiac arrest and resuscitation was commenced.

² Capnograph - A device which measures carbon dioxide levels in expired air which assists in confirming correct placement of the ETT in the trachea and not in the oesophagus.

³ The Bougie assists the clinician to pass the ETT by providing a firm and stable guidance platform.

⁴ T36-37.21

12. Nurse Edwards states that she helped set up the intubation which included arranging the sedatives and paralytics. She obtained the intubation cart and whilst unable to recall whether a bougie was on the trolley, states that it was a usual part of the equipment on the cart. She stated that there was poor allocation of tasks in the intubation. Her evidence was that whilst Dr Knott undertook pre-oxygenation of the patient using a mask and bagging circuit, they were unable to get any saturation reading as he was moving around too much. All clinicians report that his level of agitation meant that there was difficulty obtaining suction on the mask to support the flow of oxygen. It is likely that as a result his pre-oxygenation was not ideal. Nurse Phillips stated that the intervention felt rushed and disorganised. She states that the difficult intubation trolley was already in the room.
13. Nurse Phillips reports that during the course of the intubation attempt, she alerted the doctors to the fact that she could not get an oxygen saturation reading and that the patient was bradycardic and losing blood pressure⁵. She had earlier noted that it was difficult to know what his oxygen saturation was during the intubation due to a poor trace on the patient's finger.
14. Dr Vetro completed the intubation procedure. He stated that he called for capnography after intubation, but that the machine was not set up and so was not utilised. Nurse Phillips and Nurse Edwards both state that the capnograph was reconnected after the intubation. Nurse Edwards recalled that initially there was no trace on the screen as the respiratory trace had been substituted. The trace was converted to an end tidal trace and her evidence was that she saw a trace which did not represent one you would expect to see from someone who had been intubated. She stated:

*"there was discussion about what was going on and that his oxygen saturations were going down and there was questioning about whether the trace was accurate, followed by whether the patient had been intubated properly."*⁶

⁵ Exhibit 10 – Statement dated 19 March 2012.

⁶ Exhibit 8 – Statement dated 8 March 2012 and T.166.25

15. She clarified this evidence in the inquest and said that the conversation may not have specifically discussed the intubation issue but that it was one directed to what was happening and why the trace was as it was.
16. Whilst there was no confirmation by capnograph, both Dr Knott and Dr Vetro gave evidence that they observed Mr Chand's chest rise and that they had observed mist in the endotracheal tube after intubation and therefore assumed that the tube was correctly placed. The evidence of Dr McClure is that these are observations commonly relied upon as indicating correct placement of the ETT.
17. At or around the completion of the insertion of the ETT, Mr Chand went into cardiac arrest. A Code Blue call was made at approximately 1247 hours. CPR was commenced. Aramine was administered, however Mr Chand went into asystolic arrest.
18. The sequence of events in relation to the oxygenation of the patient were as follows: Between 1232 hours and 1235 hours Dr Knott administered pre-oxygenation for 3 to 5 minutes and this ceased at some time between 1235 hours and 1240 hours. It is likely, given the difficulties with the patient, that he was not well oxygenated at commencement of the intubation. The first intubation attempt undertaken by Dr Vetro, commenced at approximately 1240 hours. At approximately 1247 hours a Code Blue was called⁷. At 1256 hours the misplaced endotracheal tube was removed and by 1257 hours manual bagging had commenced.
19. The evidence establishes that Mr Chand was deprived of oxygen for a period of between 17 to 22 minutes, until after the Code Blue and the removal of the misplaced ETT at 1256 hours when manual bagging for ventilation was commenced.
20. Intensive Care Consultants, Dr Jason McClure, and Dr Andrew Ross attended the Code Blue MET call at 1248 hours. Dr McClure stated⁸ that he arrived to witness full CPR in progress with an asystolic ECG trace on the monitor and that the absence of ETCO₂ trace on the monitor was attributed to the fact that he had no cardiac output or secondary to a tension pneumothorax. He was told the patient had developed worsening hypoxia, had been re-intubated by Dr Vetro and despite this remained hypoxic and subsequently arrested. As he

⁷ Exhibit 7 – Code Blue documentation

⁸ Exhibit 1 and T64.10

knew that Mr Chand had a previous left sided pneumothorax he performed a negative needle decompression of the left hemithorax.

21. Dr Ross arrived at the same time and subsequently removed the ETT after it was confirmed to be in the oesophagus by fibre optic scope. He successfully intubated the trachea using a gum elastic bougie as the patient had a Grade 3 view at laryngoscopy. Prior to this intubation attempt, the patient had been oxygenated with Bag/Mask ventilation. He stated that Mr Chand had return of spontaneous circulation after approximately 20 minutes. This period includes the period where he was not being oxygenated. Therapeutic hypothermia was performed for 24 hours as a strategy for neurological protection.
22. It appears that neither consultant was advised that a bougie had not been used for intubation and that there had been no end tidal confirmation of tube placement. Dr McCann's evidence was that when he attended he had taken it in good faith that the patient had been intubated correctly and that he had not been told that they had problems intubating, nor that they had intubated blindly. Dr Ross stated⁹ that he was not told of any concern about the placement of the endotracheal tube and that he initially assumed that tube placement had been confirmed by end tidal CO₂ prior to the cardiac arrest.
23. It appears that it was assumed by both Consultants that there had been confirmation of placement. As a result, when Dr McClure observed that there was no ETCO₂ trace he considered whether there was a pneumothorax and performed needle aspiration.
24. Dr Ross then called for bronchoscopy, which confirmed the ETT was incorrectly placed in the trachea. Bag and mask ventilation was commenced with a return of end tidal CO₂ trace. Dr Ross re-intubated and cardiac output and respiratory function was re-established. He stated:

"A bougie was required to enter the oedematous glottic opening, which was barely visible behind the swollen epiglottis. I was not able to advance an 8mm endotracheal tube over the bougie into the trachea and subsequently successfully passed a 7mm endotracheal tube over the bougie at approximately 1300 hours before ventilation with bag and mask was

⁹ Exhibit 5 and T128.9

resumed. The end tidal trace returned almost immediately and the patient's cardiovascular condition soon stabilised with continued inotropic support."

25. Dr McClure accepted that the flat line capnograph observed when he entered the room was an indication of oesophageal intubation and whilst it was also possible it was indicative of other things including cardiac arrest, tension pneumothorax and equipment malfunction, that oesophageal intubation ought to have been of the highest suspicion.
26. The fact that Mr Chand regained cardiac output promptly upon correct placement of the ETT suggests that the issue which gave rise to the event was the inadequate oxygenation and failed intubation and not a precipitating cardiac event.
27. Mr Chand was stabilised and on 16 March 2009, he was weaned off his sedation however there was no neurological response and an EEG and cerebral perfusion scan showed no neurological activity. Life support measures were withdrawn and Mr Chand died on 20 March 2009.
28. An autopsy was performed and the forensic pathologist Dr Paul Bedford reported that the cause of death was hypoxic encephalopathy in the setting of recent myocardial infarction with coronary artery bypass grafts.

The expert report

29. Associate Professor Charles Corke, Intensive Care Medicine Specialist was asked to provide expert advice and comment upon the clinical course and in particular the management of the circumstances of the re-intubation on 13 March 2009. Associate Professor Corke reported¹⁰:

"The decision to extubate Ruben Chand on 13 March 2009, appears reasonable but there were numerous factors that made deterioration and a requirement for re-intubation more likely than usual. These factors include agitation, inability to obey commands, fever, compromised cardiac function and 'copious thick purulent sputum'. There is no record of an awareness that Mr Chand might prove difficult to intubate and there is no evidence that there was difficulty experienced at the Royal Melbourne at the time of the first

¹⁰ Exhibit 11 - Expert Report Professor Corke dated 29 April, 2012.

intubation. Deterioration appears to have been appropriately recognised and the plan to re-intubate was appropriate. The re-intubation appears to have been performed urgently in response to the rapid deterioration of Mr Chand after he was extubated."

30. Associate Professor Corke commented that confirmation by capnography ought to have occurred. He commented that whilst visual methods of confirmation of placement such as misting and chest sounds are able to be utilised, these are not reliable methods of confirmation and that the most reliable method of confirming placement of the endotracheal tube, is end tidal CO2 monitoring.
31. He stated that this method is mandated by the College of Anaesthetics and Intensive Care Medicine¹¹ to confirm placement and is recommended by the Joint Faculty of Intensive Care Medicine Guidelines¹². The latter providing that capnography must be available at each bed in the intensive care unit and must be used to confirm placement of the endotracheal or tracheostomy tube immediately after insertion.
32. Associate Professor Corke observed that no formal failed intubation drill was instituted in the case of Mr Chand, because it appeared that there was a failure to recognise that there had been a failed intubation. This only being confirmed by the consultant and after bronchoscopy.
33. Associate Professor Corke observed that the flat trace observed by Dr McClure, should have caused consideration that the tube could be incorrectly positioned, even in the presence of cardiac arrest and resuscitation. Whilst he accepted that where an emergency intubation is required, it might be reasonable to proceed to intubate rather than delay and await equipment, he stated that capnography should be applied as soon as afterwards available. He was also of the opinion that Mr Chand's situation was one where time would have been beneficially spent in planning the procedure and ensuring roles were clear and equipment available and functioning.
34. His evidence was that the procedure suffered from a failure to adequately plan the task about to be undertaken. His evidence was that allocation of roles, assessment of potential difficulties

¹¹ ANZCA PS18 and CICM IC-01

¹² IC-01- 9.3.9

and ensuring equipment was functioning in advance were essential steps and appropriate in almost all intubation cases, of which this was one¹³.

35. At the opening of the inquest the hospital conceded that there were systemic failures throughout the intubation and resuscitation and in particular relating to unexpectedly difficult intubation, which resulted in a subsequent cardio respiratory arrest with tragic outcome for Mr Chand and his family. During the course of the inquest the hospital made the concession that the cause of death was a hypoxic episode that led to brain death or hypoxic encephalopathy and which in turn led to the turning off of Mr Chand's life support machine. The hospital also acknowledged that the management of the intubation process was not of an appropriate standard.
36. Dr Vetro also conceded that his performance in managing the airway could and should have been better and that there should have been greater attention paid to maintenance of proper oxygenation during the re-intubation, particularly bagging between the attempts for re-intubation by Dr Knott and Dr Vetro. It is evident that Dr Vetro undertook the tasks to the best of his ability in what he and the other clinicians present described as very trying circumstances.
37. Family submitted that the period of oxygen deprivation resulting from the medical mismanagement of Mr Chand whilst he was in the ICU was a significant factor and caused and contributed to the death.

Findings as to Cause and contribution to death

38. The evidence is that this was a very challenging and difficult clinical situation and that there were a number of factors which aligned to confuse or to confound the registrars in the course of the intubation and afterwards. There were however a number of issues with the management of the patient which were less than ideal. I turn to consider those matters.
39. The hospital guidelines for airways management in the ICU¹⁴ as at February 2009, directed that the consultant be advised before an attempt is made to intubate a patient and the evidence

¹³ Exhibit 11 and T188. This was also the evidence of Dr Ross and Dr McCann.

¹⁴ Exhibit 2 – Alfred Hospital Guidelines for Airways Management in the Intensive Care Unit (19 February 2009)

is that this did not occur. These guidelines were not known to Dr Knott or Dr Vetro and it appears had not been brought to their attention, and therefore the notification was not made. The evidence establishes that the failure to follow the directed procedure of notification of the consultant before attempting the re-intubation, resulted in the loss of an opportunity to either engage a more experienced clinician in undertaking the procedure, or to obtain advice and information as to undertaking the procedure.

40. Had notification occurred it is likely that there would have been attendance at the re-intubation by the Consultant and the procedure undertaken differently and in a more controlled manner. The degree of difficulty resulting from the less than ideal airway view, whilst not something which was anticipated by the registrars, is likely to have been more adequately responded to, if there had been involvement of a more experienced medical specialist. This would appear to be the very issue which the hospital guidelines as to notification of the consultant, are designed to address in requiring notification of the consultant.
41. I am satisfied that had a more senior clinician been present at the commencement of the re-intubation it is likely that the procedure would have been successfully undertaken and that the death would have been prevented.
42. There was a failure to adopt failed intubation protocols which resulted in there being no manual bag and mask ventilation taking place for a significant period of time, within which time I am satisfied that Mr Chand sustained hypoxic brain injury, resulting in his death.
43. There was a failure to utilise capnograph to confirm placement of the endotracheal tube, resulting in a delay in identification that the tube had not been correctly placed and consequently was a contributing factor to the hypoxia and the consequent death.
44. I am satisfied the evidence establishes that there was a failure to maintain adequate oxygenation during the course of the attempts at intubation undertaken by both Dr Knott and Dr Vetro. During the first intubation period being undertaken by Dr Knott and then by Dr Vetro, intermittent manual oxygenation by bag and mask was appropriate. Dr McClure's evidence was:

*"I think at that point the key's to probably slow down. The focus quite often becomes the intubation whereas it's not what's paramount. Q- What's paramount is oxygen?--- Oxygenation and I think the key at that point is to stop and go back to your previous plan of bag valve, bag mask ventilation."*¹⁵

I find that the failure to maintain adequate oxygenation of the patient contributed to the death.

45. The evidence establishes that there was a Grade 2B or Grade 3 airway, which is a poor view and which resulted in the intubation being more difficult than anticipated. Whilst Mr Chand had been noted to be difficult in intubation at the Royal Melbourne Hospital, there was no process for this information to be conveyed to the medical clinicians at the Alfred Hospital. I am satisfied that had this information been available it is likely that there would have been different management of both the extubation and the re-intubation on 13 March 2009, and that the hypoxic injury and consequent death would have been prevented.

In that context, I find that the lack of that information contributed to the death.

46. The level of the patient's neurological response is relevant to the ultimate issue of cause or contribution to the death, as it is necessary to determine whether the degree of hypoxic brain injury sustained was one which had occurred at some time prior to the failed intubation or as a result of that procedure or partly as a result of that procedure. Mr Chand was a very seriously ill man with multiple issues. His cardiac impairment was significant and he was being considered as a candidate for transplantation. The evidence is that he may have sustained some degree of hypoxic brain injury at the initial cardiac event. The evidence is also that his prospects for a complete recovery from his cardiac ailment were low absent further intervention.

47. However, the evidence satisfies me that that the arrest on 13 March 2009, which resulted in the significant hypoxic brain injury and to Mr Chand's death was a hypoxic arrest caused by the lack of oxygen in the period during the course of the failed intubation procedure on 13 March 2009 and continuing until the bag and mask oxygenation was resumed at 1257 hours.

¹⁵ T32.19

48. I find that Mr Ruben Chand died on 19 March 2009 at the Alfred Hospital and that the cause of his death was hypoxic encephalopathy in the setting of recent myocardial infarction with coronary artery bypass grafts.

COMMENTS

Pursuant to section 67(3) of the Coroners Act 2008, I make the following comment(s) connected with the death:

1. There were a number of deficiencies in the medical management of Mr Chand which have been considered by this inquest and acknowledged by the interested parties in the proceedings. They have been extensively considered in this finding. I am satisfied that the interested parties are aware of the procedural issues and medical management deficiencies which gave rise to the events resulting in Mr Chand's death and have responded to those matters.
2. The hospital has taken steps to ensure that their intensive care medical and nursing staff are now all familiar with the intubation guidelines. I am satisfied that the protocols and procedures for patient oxygenation and airway management, whilst not applied in this case, are well understood and inherent to the practice of intensive care medicine. Ongoing learning in this regard is part of the day to day supervision of intensive care registrars and nursing staff and the hospital has introduced additional advanced life support training with emphasis on the factors which were problematic in this case, including oxygenation as a priority and focused responsiveness rather than speed, and allocation of roles. In my view there would be no efficacy in making further comment or recommendations in relation to those matters.
3. One matter upon which the parties submitted I ought comment, is the lack of availability of critical clinical information to clinicians as between hospitals on transfer of patients between facilities.
4. The Alfred Hospital has submitted that it would have been of assistance to the clinicians in making decisions as to the medical management, if they had known of Mr Chand's history of difficult intubation at the Royal Melbourne Hospital. This was also the evidence of the Consultants and accepted to some extent by Associate Professor Corke.

5. Whilst it seems to me that this deficiency would have been overcome by the adoption of a planned intubation procedure and the existing hospital protocols, nevertheless I accept that in this case it would likely have resulted in a different course being adopted in Mr Chand's management and that there may be future preventative benefit in such information being available.
6. Whilst it may be some time before a comprehensive electronic patient medical records data base will be available in Australia, as a medical summary is sent with the patient on transfer it would seem that information such as that might be relatively easily recorded manually onto that summary. This may be a practice that the major public hospitals may agree to adopt.

RECOMMENDATIONS

Pursuant to section 72(2) of the **Coroners Act 2008**, I make the following recommendation(s) connected with the death:

1. That when a patient is transferred from one public hospital to another, information about their intubation status and any difficulty with intubation be recorded and conveyed to the receiving hospital.
2. That the Alfred Hospital initiate discussions with the major public health services in order to achieve processes to this end.

I direct that a copy of this finding be provided to the following:

The family of Mr Ruben Chand;
The Interested Parties;
Associate Professor Charles Corke.

Signature:



K. M. W. PARKINSON
CORONER
Date: 16 July 2012

