



## FINDING OF INQUEST

*An Inquest taken on behalf of our Sovereign Lady the Queen at Adelaide in the State of South Australia, on the 6<sup>th</sup> and 7<sup>th</sup> days of July 2009, the 12<sup>th</sup> and 13<sup>th</sup> days of August 2009 and the 31<sup>st</sup> day of December 2009, by the Coroner's Court of the said State, constituted of Anthony Ernest Schapel, Deputy State Coroner, into the death of Matthew John Lynn.*

*The said Court finds that Matthew John Lynn aged 20 years, late of Lynn Road, Coonawarra, South Australia died at Flinders Medical Centre, Flinders Drive, Bedford Park, South Australia on the 27<sup>th</sup> day of January 2005 as a result of hypoxic encephalopathy. The said Court finds that the circumstances of his death were as follows:*

### **1. Introduction**

1.1. Matthew John Lynn, aged 20 years, died on 27 January 2005 at the Flinders Medical Centre (FMC) Intensive Care Unit (ICU). I heard an Inquest into the cause and circumstances of his death in July and August 2009. Matthew Lynn's hospitalisation at the FMC was the result of his having been struck by a vehicle at Robe in the early hours of the morning of 15 January 2005. Following that incident, a young woman was charged with a serious criminal offence that had as one of its elements the causation of Matthew Lynn's death, namely causing death by dangerous driving. Accordingly, by virtue of Section 21(2) of the Coroners Act 2003, this Court was precluded from holding an Inquest into Matthew Lynn's death until such time as the charge against that person was resolved. The prosecution was eventually concluded which enabled this Court to proceed with Matthew Lynn's Inquest.

- 1.2. The cause of Matthew Lynn's death was hypoxic encephalopathy. Matthew had suffered an acute and fatal episode of deprivation of oxygen from his brain. Hypoxic encephalopathy is the pathological result of that deprivation. This cause of death was established by way of an extraordinary route. Matthew Lynn's presence in the FMC was occasioned by the fact that he had received serious head injuries as a result of being struck by the vehicle at Robe. There had been clinically identified internal head injuries that had required Matthew Lynn to be intubated by means of an endotracheal tube (ETT) and to be artificially ventilated. Prior to Matthew Lynn's eventual death, there was a period of time during which the ETT had become dislodged and he had consequently been deprived of oxygen. The dislodgment of the ETT was at first not recognised. As a result of the acute deprivation of oxygen, Matthew suffered a cardiac arrest. This had necessitated an extended period of cardio-pulmonary resuscitation (CPR), the effectiveness of which would have been compromised by inadequate ventilation caused by the dislodgment of the ETT. It was only when it was finally realised that the ETT was in the incorrect position, and Matthew was correctly reintubated, that he was resuscitated. Notwithstanding his resuscitation, severe cerebral oedema was diagnosed and he was ultimately declared to be brain dead. There was at that time a high degree of suspicion, if not clinical certainty, that Matthew Lynn had suffered a severe hypoxic brain injury caused by the deprivation of oxygen that had occurred in the clinical setting at the FMC ICU that I have described.
- 1.3. Matthew Lynn's death was reported to the State Coroner. A post mortem examination was ordered to be performed and this took place on 31 January 2005. Dr Allan Cala, who at that time was a forensic pathologist employed by Forensic Science SA, performed the post mortem that included a full autopsy, save and except in respect of those organs that had been surgically removed for transplantation purposes. Dr Cala furnished an autopsy report for the Coroner dated 23 May 2005. In that report, which I received into evidence<sup>1</sup>, he expressed the cause of death as being *'blunt force head trauma due to a motor vehicle collision'*. His report also describes a compound fracture of the left tibia and fibula and a right pneumothorax as being other significant conditions that contributed to the death but which did not relate to the disease or condition causing it. It will be observed that an hypoxic brain injury forms no part of that diagnosis. It is clear from the report that Dr Cala had been made aware

of the incident involving Matthew Lynn's intubation and the subsequent resuscitation and treatment for a suspected hypoxic brain injury. His report also makes reference to the CT scan that had revealed severe cerebral oedema and to the ultimate declaration of brain death.

- 1.4. The professionalism of the solicitor employed by the Office of the Director of Public Prosecutions, Ms Rosie Thewlis, who had carriage of the prosecution against the person who had been charged with causing Matthew Lynn's death, resulted in a review of the stated cause of Matthew Lynn's death. For the first time, specialised testing of samples of Matthew Lynn's brain tissue, that fortunately had been retained, was ordered. The additional testing was undertaken in an attempt to differentiate between traumatic brain injury and hypoxic brain injury. As a result of the further testing, generalised cerebral hypoxia, as evidenced by hypoxic encephalopathy upon examination of the brain tissue, was identified. In this regard I refer to the report of Professor Peter Blumbergs which I accept<sup>2</sup>. In the light of those findings, Dr Cala, who originally provided the post mortem report which had expressed the cause of death in terms of a traumatic brain injury, recast his report and arrived at a cause of death expressed as '*hypoxic encephalopathy in a person with blunt force head trauma*'. In his fresh report<sup>3</sup>, Dr Cala states the following:

'Professor Peter Blumbergs, of IMVS, was also requested to perform specialised Amyloid Precursor Protein (APP) stains of the brain after review was suggested. These stains may sometimes be able to differentiate traumatic brain injury from hypoxic brain injury.

The results of these further stains show widespread APP staining throughout many areas of the brain, which is most likely due to generalised cerebral hypoxia subsequent to a cardiac arrest and not from primary cerebral trauma.

The amount of traumatic brain injury found at autopsy seems insufficient of itself to account for death, although the head injury initiated a series of events which ultimately led to this man's death.'<sup>4</sup>

- 1.5. Having regard to the high level of known clinical suspicion that Matthew Lynn's death had been the result of an hypoxic brain injury, it is not clear to me why the further testing conducted by Professor Blumbergs was not undertaken as a routine part of the original post mortem procedure. Dr Cala's second report is dated 3 July 2007

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<sup>1</sup> Exhibit C35a

<sup>2</sup> Exhibit C3b

<sup>3</sup> Exhibit C35

<sup>4</sup> Exhibit C35, page 3

which is dated more than two years after the date of the original report. For a substantial proportion of the intervening period, those involved in the prosecution arising out of Matthew Lynn's death were under an erroneous impression as to his cause of death and, importantly, as to the extent of the contribution of the actions of the charged person in respect of that cause of death.

- 1.6. It appears that as a result of the amended post mortem report, a less serious charge that did not involve as a core allegation the causation of Matthew Lynn's death was proceeded with and the matter was satisfactorily resolved.
- 1.7. I find that the cause of Matthew Lynn's death was hypoxic encephalopathy. In his second post mortem report Dr Cala has reassigned the role of the head injury as having initiated a series of events which ultimately led to Matthew Lynn's death. I do not take it that there is necessarily a pathological connection between the head trauma and Matthew Lynn's death. In fact, when Dr Cala's second report is properly evaluated, it eschews that very suggestion notwithstanding the reference to the head trauma in the recitation of the cause of death. Rather, the head trauma has set the scene for Matthew Lynn's admission to hospital during which he was intubated and then suffered the hypoxic brain injury when his intubation was compromised. That being the case, I do not include reference to what is in reality a circumstance of Matthew Lynn's death, namely the blunt force head trauma, as part of the cause of death itself.
- 1.8. I add here that in the opinion of Professor Andrew Bersten, who was in January of 2005 the Deputy Director of the FMC ICU, and who is now Director of the same, it is likely that Matthew Lynn would have survived his injuries but for the cardiac arrest following the incident involving his intubation<sup>5</sup>. I accept that evidence.
- 1.9. In this Inquest Ms Amy Cacas appeared to assist me. Ms Joanne Cliff appeared for and on behalf of the Southern Adelaide Health Service which is the entity that encompasses the FMC. I also gave leave to appear to Mr Brian Lynn, Matthew Lynn's father. Mr Lynn took full part in the proceedings. In his final address, Mr Lynn generously paid tribute to the diligence of Ms Thewlis of the Office of the Director of Public Prosecutions in instigating the review of Matthew Lynn's cause of death. In doing so, he pointed out that but for her work there may have been a

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<sup>5</sup> Transcript, page 38

miscarriage of justice in respect of the prosecution of the person who had been charged with causing the death of his son. I place on public record my agreement with all of Mr Lynn's observations regarding the work of Ms Thewlis.

## **2. Matthew Lynn's intubation**

- 2.1. Matthew Lynn suffered a number of serious injuries as a result of the incident at Robe on 15 January 2005. He had a closed head injury, chest trauma with a resulting right pneumothorax and a compound fracture of his left leg that involved both the tibia and the fibula. He had undergone surgery to reset the bony leg injuries. The leg injuries required a skin graft. While within the FMC ICU Matthew also developed a staphylococcal chest infection.
- 2.2. In the light of the apparent severity of his head injury he was intubated with an ETT and sedated. He was treated within the FMC ICU and as the days went by, the indications were that he was improving. However, as is commonplace with young people who have suffered a head injury, Matthew Lynn suffered from periods of agitation that manifested itself in vigorous physical exertion notwithstanding his sedation and confinement to bed.
- 2.3. During the period in which Matthew Lynn was intubated, he was ventilated with positive pressure ventilation. The ventilation was administered through the ETT that had been inserted in Matthew Lynn's trachea, which is the windpipe. I am not certain whether positive pressure ventilation existed for the whole of his intubation, but it appears that notwithstanding positive pressure ventilation, Matthew Lynn was to a greater or lesser degree able to breathe under his own power as well. Oxygen is administered through the ETT directly into the lungs. The ETT is also the conduit through which carbon dioxide is expelled from the lungs. Naturally, one of an intubated patient's vital signs that are continuously monitored within an intensive care environment is the patient's oxygen saturation levels. Ideally, the oxygen saturation levels should be close to 100%. I was told in evidence that figures below 90% are alarming and figures in the 70% to 80% range are indicative of significant hypoxia, which is deprivation of oxygen from the tissues. Needless to say, the brain is an organ that is extremely sensitive to hypoxia. The heart is an organ that is also unfavourably affected by hypoxia. Deprivation of oxygen from the brain for periods of only a few minutes can result in permanent brain damage. Hypoxia for longer

periods can result in a cardiac arrest as happened with Matthew Lynn. The brain damage can be so profound as to result in brain death. This also happened in Matthew's case.

- 2.4. The expulsion of carbon dioxide through an ETT can be detected by a process known as capnography. The evidence suggests that capnography can be administered in two ways. A device such as an 'Easy-Cap' can be utilised to detect the expulsion of carbon dioxide at a particular moment in time. This is detected by changes in colour in the device. A change in colour is indicative of the fact that carbon dioxide is being satisfactorily expelled from the lungs through the ETT. This provides an indication that the ETT is in the correct position. The second method of administering capnography consists of continuous capnography which is afforded by a device that is continuously engaged with the patient's ETT and which indicates the continued expulsion of carbon dioxide from the lungs. The expulsion of carbon dioxide on an ongoing basis is again an indicator that the ETT is appropriately placed within the trachea. At the time with which this Inquest was concerned, Matthew Lynn was not being monitored by way of continuous capnography. Certain guidelines suggested that capnography ought to be utilised in order to check correct intubation after its initial insertion, but I did not understand there to have been any requirement or guideline that all intubated patients should be the subject of continuous capnography except in a surgical setting or in other settings where general anaesthesia is in place. I heard evidence that within the FMC ICU there were a limited number of devices that could deliver continuous capnography, but that there were a number of Easy-Cap devices that could be utilised on an as needs basis. In the event, at no time during Matthew Lynn's intubation incident was capnography utilised as a means of checking the position of the ETT.
- 2.5. An ETT must be inserted and positioned within the trachea correctly. If inserted too far into the trachea it may enter one of the bronchi and ventilate only one lung. This situation is highly undesirable. On the other hand, the device has to be inserted to a sufficient depth to ensure that it delivers air and/or oxygen to the lungs through the trachea. One situation that is assiduously to be avoided is the accidental insertion of an ETT into the oesophagus which is the tube that carries food from the mouth to the stomach. If this occurs and positive pressure ventilation is in place, the stomach will fill with air. More critically, it would also mean that if the patient is not self-

ventilating, the patient will very likely not receive any or proper ventilation. For obvious reasons this is also an undesirable situation which would lead to deprivation of oxygen and possibly death. The tip of the ETT must pass through the patient's vocal cords into the trachea. On visualisation with a laryngoscope, a correctly inserted ETT can and should be seen to pass through the vocal cords. If the ETT is correctly positioned, this should be visible to the clinician. Equally, if the ETT has been incorrectly inserted in the oesophagus, this should also be visible through the laryngoscope. Direct visualisation by laryngoscopy is the most definitive means by which correct positioning of an ETT can be established.

- 2.6. The ETT has a 'cuff' at one point along its length. The cuff, which can be inflated after the ETT is inserted, is intended to provide a seal between the ETT itself and the internal walls of the trachea. It aids in efficient ventilation, particularly where positive pressure ventilation is in place. Another purpose of the cuff is to prevent, as far as possible, the aspiration of stomach contents into the lungs via the space between the ETT and the internal walls of the trachea. Although I was told that an ETT might not be completely efficient in this regard, it should prevent copious aspiration. In order to establish the seal, the cuff is inflated after the ETT is inserted and it should remain inflated for the duration of its insertion. There is also a pilot cuff that can be viewed from the external part of the ETT. This provides an indication as to whether or not the cuff within the trachea is appropriately inflated. Upon viewing the position of an ETT through a laryngoscope the clinician should not be able to visualise the cuff, which should remain in a position below the vocal cords.
- 2.7. There are other indicators that might signify whether or not the ETT is correctly positioned. For example, listening to the chest through a stethoscope, a procedure known as auscultation, might reassure the clinician that the patient is being properly ventilated in both lungs through a correctly inserted ETT. Similarly, if one were to auscultate the abdomen and hear sounds that were consistent with air being delivered into the stomach, it might provide some indication that the ETT is incorrectly situated within the oesophagus especially if distension of the abdomen was also observed.
- 2.8. The ETT itself is secured externally to eliminate, or minimise, the risk of it moving within the patient. The depth to which it is secured can be measured. I heard evidence that the depth to which it should be secured might to some degree depend upon the size of the patient and that one of the relevant parameters is the patient's

height. Matthew Lynn was as much as 190cm in height. The ETT in his case was secured to 22cm, which was said to be marginal in a person of his height. I observe that Matthew's clinical record reveals that after the incident in question it was inserted to depths of 23cm and then 25cm.

- 2.9. It is not unheard of for an ETT to move during a patient's intubation, and sometimes it may even move from the trachea into the oesophagus. This happened in Matthew's case. For very obvious reasons, such an event requires immediate detection and rectification. Physical exertion on the part of the patient is one possible means by which an ETT might move.
- 2.10. Self-extubation where the patient physically removes the ETT for whatever reason be it agitation, discomfort or otherwise, might also occur.
- 2.11. One of the key performance indicators of an intensive care unit is its ability to limit the frequency of incidents involving incorrectly placed ETTs.
- 2.12. On the morning of 21 January 2005 Matthew Lynn suffered a period of agitation during which he self-extubated. This was detected quite quickly. He suffered no ill effects from the extubation, although his agitated movement resulted in damage to the surgical repairs to his leg. Following the extubation Matthew was seen to breathe on his own. That morning he received a visit from his sister and he conversed reasonably lucidly with her, although he was restless. Although the extubation was unscheduled, consideration was given to allowing Matthew to remain extubated having regard to his improvement. However, a decision was made that he should be reintubated and this took place later that day. Dr Christopher Jackson, at the time a junior registrar in FMC ICU, explained in his evidence the reasons for that decision. The reasons included the fact that Matthew had an inadequate ability to clear respiratory secretions by coughing, that his oxygenation was not satisfactory with the tube out and that he had an existing pneumonic infection that added to the oxygenation difficulty. In addition, he had been experiencing periods of agitation in which he had already once damaged the surgical repairs to his leg and it was felt that he needed to be sedated to a level in order to counter the risk of again damaging his limb. Matthew Lynn also had to undergo surgery in order to have the further damage to his leg rectified. In short, there can be no suggestion that the decision to reintubate Matthew Lynn was other than reasonable.

- 2.13. When Matthew was reintubated that day, the ETT was inserted to 22cm. Although this depth is said to be marginal, there can be no suggestion that the problems that eventually led to his death were created, and should have been identified, at that point in time. The fact that he was able to undergo surgery and survive for more than 24 hours with satisfactory oxygenation and with no adverse incident affords proof that the reintubation had been correctly administered. It is clear, however, that by the early hours of the Sunday morning 23 January 2005, the ETT had moved into a dangerous position.
- 2.14. The fact that Matthew Lynn's ETT was satisfactorily positioned following reintubation on 21 January 2005 was confirmed by radiology. An X-ray taken on the morning of 22 January 2005 revealed that the ETT tip was projected 4cm above the carina, an anatomical feature situated at the site of the bifurcation of the trachea into the left and right bronchi. This position was said to be reassuring and, in any event, confirms that the tube was positioned within the trachea at that point in time.
- 2.15. The evidence did not establish with sufficient clarity whether the depth to which the ETT was inserted contributed to its eventual displacement.

### **3. The incident involving Matthew Lynn's cardiac arrest**

- 3.1. The times at which various facets of this incident occurred are of some significance as they demonstrate that there was a substantial period of time during which Matthew Lynn's intubation was dangerously positioned. Most of the notes that were made by the clinicians involved were made in retrospect. One of the intensive care nurses who was involved in the incident was Mr Keith Bell. Mr Bell made a note in the progress notes which form part of the FMC clinical record<sup>6</sup>. The time of his note is 0550 hours on 23 January 2005. On the day after these events he also prepared a statement of two pages that he retained for his own purposes. The statement did not form part of the FMC clinical record. Mr Bell was called at the Inquest and he produced that typed statement<sup>7</sup>. Another unidentified nurse has made a note timed at 0500 on 23 January 2005. The medical practitioners involved in the incident, including Dr Ravi Bangia, made other notes in the clinical record. Dr Bangia's notes are not helpful as to times - nor was his evidence when he testified in the Inquest. To my mind the times as recorded by the nursing staff, in particular Mr Bell, can be relied on.

- 3.2. The time at which the incident could be said to have commenced was 0020 hours (12:20am) on 23 January 2005. That time is recorded by Mr Bell in his clinical note as well as in his self-made statement and it is also referred to in a note compiled by another member of the nursing staff who was involved in the incident<sup>6</sup>. At that time Matthew Lynn is recorded by that other member as becoming restless. He was thrashing his legs around the bed. He was reassured and given Propofol. While the nurse was restraining his legs, Matthew Lynn raised his head slightly and started coughing forcefully. Bloodstained phlegm started bubbling from his mouth. Liquid that was variously described as bile, or bilious fluid, then started to emerge from his ETT. This was in fact Matthew's stomach contents. Mr Bell was called to Matthew Lynn's bedside to assist. At the Inquest Mr Bell gave an account of the matter. Mr Bell noted that the ETT was still tied at 22cm at the teeth. He observed that the patient was bringing up bilious fluid through the ETT itself. Matthew Lynn was given 100% oxygen by way of hand ventilation. There was also regular suctioning of the ETT that involved large amounts of bile coloured fluid being obtained from the tube.
- 3.3. The copious quantity of fluid emerging from within the ETT itself gave rise to a concern about the correctness of its placement. I heard evidence that large quantities of gastric contents might be brought up through an ETT in a number of scenarios. Included within them is the possibility that the ETT is situated within the oesophagus so that there is a direct connection between the stomach contents and the tube. This would explain the production of large quantities of gastric contents through the tube itself. Alternatively, the stomach contents might ascend via the oesophagus and then descend into the trachea past the imperfect seal of the ETT cuff, then into the lung and then ascend through the tube itself. I was told that this would involve a significant imperfection in the seal of the cuff such as a deflation. A third possibility might be that a correctly inflated tube was sitting at or just above the larynx. This position would have afforded some oxygenation of the lungs but might have been ineffective in preventing gastric contents from moving up the oesophagus and down the trachea. These different scenarios were explained to me in the evidence. Possibly the clearest explanation was provided by Dr Christopher Jackson who at the time with which this Inquest was concerned was an Anaesthetic Registrar working in the FMC ICU. Dr

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<sup>6</sup> Exhibit C34

<sup>7</sup> Exhibit C39

Jackson himself was involved in Matthew Lynn's incident. He candidly told me that there were shortcomings in his own performance. I found Dr Jackson to be an ingenuous and straightforward witness and I accepted his evidence. The explanation that he gave about the possibilities involving the regurgitation of stomach contents through an ETT accorded with the three scenarios that I have just described<sup>9</sup>. I also heard evidence on this topic from Dr Geoffrey Parkin who is an intensive care specialist and expert from Victoria. Dr Parkin provided the Court with an expert overview of Matthew Lynn's management. I will discuss the thrust of his opinions in a separate section within these findings. On this particular point, however, he suggested that bile being aspirated from the ETT in these circumstances suggested some continuity between the gastrointestinal tract and the respiratory tract. It usually means that the cuff is not acting as a competent seal against material entering the trachea. That occurrence together with hypoxia gives rise to a suggestion that the ETT has become displaced. To my mind the fact that bile was emerging from Matthew's ETT in such copious quantities as described is inconsistent with anything other than a displaced tube or a defective or non-inflated cuff. The question of the need to reintubate would in those circumstances have to be seriously entertained.

- 3.4. Mr Bell attempted to auscultate Matthew Lynn's lungs but found it difficult to hear due to the fact that Matthew was retching but, on auscultating his abdomen, it sounded to Mr Bell like air was entering the stomach. In his statement made the following day, Mr Bell has recorded that it was difficult to determine for certain whether air was in fact entering the stomach at that point. Nevertheless, the possibility that air was entering the stomach could only have served to heighten the suspicion that the ETT was not in the right place.
- 3.5. Dr Ravi Bangia was called to attend Matthew Lynn's bedside. Dr Bangia and Dr Jackson were the two on duty registrars in the ICU that night. Dr Bangia obtained his basic medical degrees in India in 1997. He obtained a degree in anaesthesia in India in 2002. He migrated to Australia in March 2004 and commenced work as a medical practitioner at the FMC ICU. At the time with which this Inquest is concerned he was a trainee Intensivist. Although only a junior registrar, it is worthy of note that at that time Dr Bangia had the overseas anaesthetic qualification to which I have referred. At the time of this Inquest he was working at the Austin Hospital Department of

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<sup>8</sup> Exhibit C34, page 66

Anaesthesia in Victoria. Dr Jackson, who was also a junior registrar, was to tell me that he viewed Dr Bangia as being the more senior practitioner in the light of the latter's qualifications and experience. Dr Bangia was a medical practitioner who was well versed in the technique of intubation and in particular had experience in the use of the laryngoscope to detect whether or not an ETT was correctly positioned. Dr Bangia was called to Matthew Lynn's bedside at approximately 12:30am. Dr Bangia gave evidence in the Inquest. When Dr Bangia arrived at Matthew Lynn's bedside one of the nurses was performing suction of the ETT and Mr Bell was ventilating Matthew Lynn with 100% oxygen via a bag and mask. Dr Bangia was told that Matthew Lynn had been thrashing about and fighting with the ventilator. Large amounts of bile stained fluid were still emerging from the ETT. Despite the fact that Matthew Lynn was being administered 100% oxygen, his oxygen saturations went down to levels within the 70% and 80% range which signified to Dr Bangia that Matthew was experiencing '*significant hypoxia*'<sup>10</sup>. Dr Bangia at first thought that the ETT had perhaps become displaced or obstructed. Nevertheless, it appeared to Dr Bangia that Matthew Lynn's chest was rising and falling and on auscultation of the chest, there was equal and good air entry. Dr Bangia told me that Matthew's abdomen was not distended. He took the bag and mask himself and found that Matthew was easy to ventilate.

- 3.6. Dr Bangia decided to view the position of the ETT through the laryngoscope. He did this having already established that the tube was still fixed at 22cm. After using the laryngoscope, Dr Bangia satisfied himself that the ETT was correctly positioned. He said in evidence that he had obtained a good clear view of the airway, that the ETT was in the trachea, that he could see the vocal cords and that the ETT was positioned through the vocal cords. Importantly, he said that he could not see the cuff above the vocal cords. In other words, to Dr Bangia's observation everything about the tube was as it should be. Dr Bangia advised those present that the tube was correctly positioned. Dr Bangia's visualisation of the position of the ETT and his assertion that it was in the correct position was to dictate the course of Matthew Lynn's management from that point onwards. A fair estimate of the time at which the ETT was visually checked by Dr Bangia is approximately 12:35am. The position of the ETT would not be re-checked visually with the laryngoscope until 1:25am when Dr

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<sup>9</sup> Transcript, pages 213-214

<sup>10</sup> Transcript, page 96

Jackson did that and found that the ETT was then incorrectly positioned within the oesophagus. As we will see, Dr Jackson up to that point in time had relied on Dr Bangia's assertions that on visualisation, the ETT had been correctly positioned in the trachea. Dr Jackson was not present when Dr Bangia performed the original laryngoscopy. The only other persons present at that time were Mr Bell and another nurse. There was no cross-checking of Dr Bangia's laryngoscopy at the time it was undertaken. I did not understand the nurses to have had any expertise or obligation in that regard.

- 3.7. In order to rectify matters, Dr Bangia removed Matthew Lynn's nasogastric tube and later tried to insert a new tube but was unable to do so as the patient continued to be restless. He administered Fentanyl and Midazolam in an effort to sedate Matthew.
- 3.8. Matthew's oxygen levels continued to be unsatisfactory and he was tachycardic with a fast heart rate of 130. According to Dr Bangia's statement to police, Matthew continued to have progressive hypoxia and at 12:53am a blood gas analysis showed features that were consistent with hypoxia to a severe degree. However, at one point in time his oxygen saturation level reached 93%. While this could be regarded as an improvement, it was still not satisfactory.
- 3.9. Matthew's treatment proceeded on the understanding that his ETT was correctly positioned. At 1:00am Dr Bangia ordered 8 milligrams of intravenous vecuronium to be administered. This is a drug that is designed virtually to paralyse the patient, and in Matthew's case, was administered for the reason explained by Dr Bangia in his evidence, namely;

'I did give that order first that Matthew was very agitated, I was thinking that probably his agitation and his moving around too much is causing him to use more oxygen so if I just paralyse him that would stop his muscles contracting and that would improve his oxygenation so that was my prime concern of giving 8 mg of vecuronium'<sup>11</sup>.

Unfortunately the paralytic effect of the vecuronium meant that any breathing that Matthew was achieving under his own power ceased. With an incorrectly positioned ETT, the cessation of his own efforts to breathe would only have served to complicate matters, and this in my view proved to be the case.

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<sup>11</sup> Transcript, page 105

3.10. Dr Jackson arrived at Matthew's bedside at about the point where the vecuronium was administered, although he did not see the vecuronium actually being given. Dr Jackson told me in evidence that prior to his arrival on the scene he had been resting in one of the on-call rooms. Dr Jackson was to tell me something of his working regime within the ICU that might have affected his own performance in this crisis and I will briefly mention something of that in due course. In any event, Dr Jackson had not been present at any time during the preceding 40 minutes or so during which Matthew was being treated in respect of this episode. Dr Jackson told me that when he arrived, the situation was clearly an unstable one. Matthew was being bag ventilated via his ETT. It was explained to Dr Jackson that Matthew had become agitated and that there had been concerns expressed about the position of his ETT. He was told by those present that the ETT had been checked by Dr Bangia and that it was understood that it was correctly placed. According to Dr Jackson's police statement that was tendered to the inquest<sup>12</sup> Dr Bangia told him that Matthew had suffered "a massive aspiration with massive amounts of gastric contents pouring out of his ETT." Dr Jackson himself could see fluid in the ETT. Dr Bangia also told him that Matthew was hypoxic with oxygen saturations at around the 70% mark. Dr Jackson accepted at face value Dr Bangia's assertions that upon laryngoscopy the ETT had been seen to be in the correct position. In his evidence Dr Jackson told me that he had the impression that Matthew Lynn had aspirated copious quantities of gastric contents into his lungs and that his falling oxygen saturations were explicable on that basis<sup>13</sup>. Of course, this might provide one theoretical clinical explanation for low oxygen saturations, but another explanation would be provided by an incorrectly positioned ETT. But Dr Jackson told me that he himself had listened to Matthews Lynn's lungs using a stethoscope and that he heard air entry<sup>14</sup>. There were crepitations that he thought were consistent with aspiration as Dr Bangia had described. Dr Jackson told me, however, that he had since learnt that in fact the crepitations were not necessarily a sign of air entry into the lungs with aspiration because insufflation of the gastrointestinal tract can also produce such sounds, and that this may well have been what he had heard. Dr Jackson could not recall if he had listened to the abdomen – he didn't think that he had, but in any event he was of the view that this would not have been a definitive measure either. Dr Jackson acknowledged that direct visualisation

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<sup>12</sup> Exhibit, C40

<sup>13</sup> Transcript, page 205

<sup>14</sup> Transcript, page 207

with laryngoscopy would have been the definitive test and that capnography would also have provided powerful evidence about the correctness or otherwise of the position of the ETT. Dr Jackson did not institute either measure when he first arrived.

- 3.11. It is clear that in the next few minutes Matthew Lynn deteriorated with his oxygen saturations falling rapidly. Whereas before he had been tachycardic, he was now bradycardic. Bradycardia is a very slow heart rate consistent with significant and ongoing hypoxia adversely affecting the performance of the heart. Matthew was also obviously centrally cyanosed. At that time Dr Jackson's differential diagnosis was aspiration with massive intrapulmonary shunting. This diagnosis would be based on an assumption that the ETT was in the correct position. Matthew Lynn was given multiple doses of Atropine and then Adrenalin, but within a couple of minutes he suffered a cardiac arrest. Mr Bell has recorded that the cardiac arrest occurred at about 1:05am. At that point CPR, that consisted of chest compressions and hand ventilation, commenced.
- 3.12. According to Mr Bell's statement, at approximately 1:10am it was noted that Matthew Lynn had defecated a large amount of brown fluid and that his abdomen was noticeably distended. These observations do not appear to have been the subject of any immediate action, but for the next 15 minutes it is clear, and not only in hindsight, that the hand ventilation that formed part of the efforts at CPR was being delivered into the stomach and not the lungs. Despite ongoing CPR, Matthew failed to respond and quite obviously so.
- 3.13. At about 1:25am, a time that is mentioned in Mr Bell's written account of events as well as in his entry within the clinical progress notes, and a time that Dr Jackson confirmed in his evidence,<sup>15</sup> one of the other nurses, a Mr Graham Roylance, queried whether they could be absolutely certain that the ETT was in the right place. At this juncture, Dr Jackson used the laryngoscope to view the ETT and rapidly established to his horror that it was in the oesophagus. Dr Jackson immediately replaced the ETT into Matthew's trachea. Dr Jackson told me that when he found the ETT to be within the oesophagus, it was inflated<sup>16</sup>.
- 3.14. After the replacement of the ETT into its correct position, Matthew Lynn responded very quickly. A regular cardiac rhythm was established after only a few minutes.

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<sup>15</sup> Transcript, page 215

After a short period of ventricular tachycardia, for which Matthew was defibrillated, he reverted to a sinus rhythm. The rapidity with which Matthew Lynn recovered his cardiac function following reintubation is of powerful significance. To my mind it is a positive indicator that all of Matthew Lynn's difficulties since 12:20am had been caused by an incorrectly positioned ETT. Certainly by 1:25am the ETT was in the oesophagus.

- 3.15. Unfortunately the long period of hypoxia resulted in significant brain damage from which Matthew Lynn succumbed on 27 January 2005. It does not appear that he regained consciousness at any time prior to his death.
- 3.16. I do not doubt that when Dr Bangia viewed the ETT he believed it was correctly positioned. His own differential diagnoses at the time were premised on that understanding. Dr Bangia acknowledged that notwithstanding his belief that the tube had been correctly positioned, Matthew Lynn had not improved. In particular his oxygen saturations did not improve and he continued to remain hypoxic<sup>17</sup>. Dr Bangia told me that he had entertained a number of possibilities regarding Matthew's predicament. He had thought that Matthew Lynn's pneumothorax may have reactivated and that his condition was deteriorating because of that. Another possibility that Dr Bangia said he entertained was that Matthew might have experienced a pulmonary embolism. A third condition that he considered was that Matthew's restlessness and continued unabated movement and thrashing around was causing his basal metabolic requirement for oxygen to be unacceptably high. He had also considered further possibilities including that the ETT had descended into the main bronchus so that both lungs were not being ventilated or that there had been significant aspiration of the bilious fluid that was compromising his lungs' ability to maintain sufficient oxygen saturation. There was also the possibility in his mind that the ETT had become displaced or obstructed. However, the possibilities of obstruction of the ETT and or displacement, be it in an upwards or downwards direction, were eliminated in his mind by his own laryngoscopy. As far as the possibility of pneumothorax and pulmonary embolism are concerned, Dr Bangia had not thought it feasible to move Matthew to a diagnostic CT scanner<sup>18</sup>. Although he had ordered an X-ray of Matthew's chest, this could not be achieved because of his

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<sup>16</sup> Transcript, page 239

<sup>17</sup> Transcript, page 102

<sup>18</sup> Transcript, page 104

continued deterioration and in any case he had considered a pneumothorax to be an unlikely diagnosis on the basis that there had been equal air entry into his lungs on auscultation.

- 3.17. All things considered it is plain in my view that Dr Bangia in the first instance, and latterly Dr Jackson, were both confounded by Matthew's Lynn's presentation. They could neither singly nor collectively discern any sensible explanation for Matthew's failure to respond to all measures. Of course, all of this has as its origin Dr Bangia's absolute conviction about, and insistence upon, the correctness of the position of the ETT. Accordingly, little or nothing was effectively done as far as improving Matthew's wellbeing is concerned until such time as Dr Jackson rechecked the tube and replaced it into the trachea.

#### **4. Evidence of Dr Geoffrey Parkin**

- 4.1. Dr Parkin provided a report to the State Coroner which basically provides an overview of Matthew Lynn's management in respect of the intubation incident that occurred in the early hours of the morning of the 23 January 2005<sup>19</sup>.
- 4.2. Dr Parkin is a Clinical Associate Professor. His curriculum vitae<sup>20</sup> reveals that he was the senior staff specialist in the Intensive Care Unit of the Monash Medical Centre in Melbourne. Prior to that he was the director of the Intensive Care Unit at that Centre between 1988 and 2001. He has a Fellowship of the Faculty of Anaesthetists, Royal Australasian College of Surgeons. He is a Fellow of the Australian and New Zealand College of Anaesthetists and a Fellow of the Faculty of Intensive Care of the Australian and New Zealand College of Anaesthetists. I regarded Dr Parkin as an expert in anaesthetics, which field naturally includes intubation and extubation of an artificially ventilated patient. Dr Parkin is an intensive care specialist.
- 4.3. In his report, Dr Parkin comments on the possible origin of gastric contents when it is aspirated from an ETT. In his view, it generally implies that the cuff of the ETT has failed in so far as it has not prevented stomach contents that has been aspirated into the laryngopharynx, larynx and trachea from entering the lung. This may be due to the cuff having deflated. The ETT may migrate upwards, allowing the cuff to lie in the larynx or the pharynx where it no longer forms an air tight seal with the trachea.

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<sup>19</sup> Exhibit C41, report dated 15 February 2009

<sup>20</sup> Exhibit C41a

In such a situation, it is likely that the other function of the cuff, namely to prevent gas from leaking from the lung to the atmosphere when the patient is on positive pressure ventilation, has also failed.

- 4.4. Dr Parkin understood that in Matthew Lynn's case there was mechanical assistance in addition to his own spontaneous breathing<sup>21</sup>.
- 4.5. Dr Parkin explained that if an ETT is not properly fixed longitudinally, or the patient is undergoing violent movement, or coughing, or is pulling on the tube themselves, or there is drag on the equipment attached to the end tube, the ETT may be upwardly displaced and, if the tip or the cuff are displaced into the larynx or particularly the pharynx, there will no longer be a pneumatic seal between the cuff on the tube and the tracheal wall. The resulting leak of gas could potentially cause a loss of tidal volume to the lungs and also could engender a propensity for aspiration of material into the lungs. Dr Parkin believed that displacement of an ETT is a relatively easy thing to happen and does not occur infrequently in intensive care units. Vigorous movement by the patient, shaking the head, extension and flexion of the neck provide reasons for an ETT commonly becoming displaced.
- 4.6. Dr Parkin expressed the view that in all likelihood Matthew Lynn's agitated behaviour and vigorous movement and occasionally violent coughing on the occasion in question had caused the displacement of the tube in his case. In this regard he specifically pointed to the nursing note written at 5:00am on the 23rd January in which the beginning of Matthew Lynn's episode is described. Matthew is there said to have been moving vigorously and coughing forcefully. Dr Parkin expressed the belief that the displacement could easily have occurred because of that vigorous movement. The blood stained phlegm that was seen to be bubbling from Matthew's mouth was consistent with the cuff probably being situated within the larynx or possibly even the pharynx, but most probably the larynx. He believed that the ETT had moved up from the trachea into the larynx where the cuff was no longer forming a proper seal. Dr Parkin believed that the origin of the bubbles would have been Matthew's lung. Although Dr Parkin was of the opinion that the ETT had become displaced, he did not believe that the ETT would have been within the oesophagus at that point in time<sup>22</sup>. Given the position of the cuff relative to the larynx, as Dr Parkin

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<sup>21</sup> Transcript, page 266

<sup>22</sup> Transcript, page 272-273

believed it to have been in to begin with, he further believed that upon laryngoscopy one would expect to see the upper surface of the cuff appearing above the vocal cords. He said that instead of seeing the ETT disappearing between the vocal cords as one should, one would instead see the cuff of the tube either sitting within or between the vocal cords or above them. If someone were to detect such a state of affairs using a laryngoscope, that person would need to deflate the cuff and then push the tube back into the trachea and reinflate the cuff. Alternatively, if that measure was not feasible, formal reintubation would have to occur<sup>23</sup>.

- 4.7. For Dr Parkin, Matthew Lynn's presentation from that point onwards, involving as it did the regurgitation of bile through the trachea as well as depleted arterial oxygen levels and hypoxia, suggested that there was some continuity between the gastrointestinal tract and the respiratory tract. This typically means that the cuff is not acting as a competent seal against material entering the trachea. Putting those two aspects of the matter together, namely hypoxia and bile emerging from the ETT itself, this ought to have raised a question as to whether the ETT had become displaced<sup>24</sup>. The fact that Matthew's oxygen saturation continued to fall despite being ventilated with 100% oxygen in Dr Parkin's opinion raised a very serious question as to whether or not oxygen was actually going into the trachea and bronchial tree in any effective way. What took place from that point onwards suggested to Dr Parkin that there was some mechanical problem with the tube. Dr Parkin said:

'The mechanical problem with ventilation seems to me to be most likely that the endotracheal tube was either obstructed or displaced, and the fact that it was displaced seems to me the more likely of those.'<sup>25</sup>

- 4.8. As to Dr Bangia's laryngoscopy, Dr Parkin acknowledged that there is some margin for error in such a procedure. Certain parts of the anatomy might prevent one from obtaining good visualisation, particularly if the patient was not at that stage paralysed. It will be noted here that Matthew Lynn was not paralysed with vecuronium until 1:00am. Dr Parkin queried the quality of view Dr Bangia had obtained. In particular he queried whether Dr Bangia could in the circumstances have identified a tube cuff that was in the larynx and whether he could determine if it was providing a competent seal. He suggested that Dr Bangia may or may not have had difficulty in seeing the

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<sup>23</sup> Transcript, page 273

<sup>24</sup> Transcript, page 277

<sup>25</sup> Transcript, page 278

laryngeal inlet and the relationship of the cuff of the tube to it. In Dr Parkin's opinion, if Matthew Lynn had still been moving around at the time of the examination this would also have further inhibited the ability to obtain a clear view and to truly have a direct visualisation.<sup>26</sup> He agreed with Counsel Assisting's proposition that a slight displacement of the ETT might go unnoticed unless a very good view was obtained on laryngoscopy.<sup>27</sup> Dr Parkin suggested that a lesson that might be learnt from these events is that there may be lesser degrees of extubation or insecure intubation that might go unnoticed upon laryngoscopy but where the patient is nevertheless at risk of gastrointestinal contents entering the trachea and the patient's ventilation becoming inadequate.

4.9. I asked this question of Dr Parkin regarding the accuracy of Dr Bangia's laryngoscopy exercise:

Q. 'Can I just ask you this question: when Dr Bangia says that the endotracheal tube was correctly positioned, what is the degree of likelihood of that being correct given Mr Lynn's presentation before Dr Bangia even looked.'<sup>28</sup>

A. 'I think in retrospect fairly unlikely that it was correct. It was obviously the correct thing to do at the time. Everybody was concerned that the endotracheal tube was displaced, I think. I think to be fair certainly to Dr Bangia, and one of the nurses had certainly raised that issue with themselves, they have said 'I'm concerned that the endotracheal tube has become displaced and the patient is not being adequately ventilated'. That is the reason presumably they did examine the endotracheal tube and to see if it passed into the larynx. My best construction on this, having looked, which was very appropriate, and formed the conclusion that it was in the right place, they persisted in that belief despite accumulating evidence to the contrary or that there was some other explanation. And, that proceeded to an unrecoverable situation.'<sup>29</sup>

I asked Dr Parkin what Dr Bangia would have actually seen or should have seen on his examination<sup>30</sup>. Dr Parkin said that he believed that at that point in time there had been a dysfunction of the tube and that it was most likely that the cuff of the tube was situated above the vocal cords. If so, the cuff should normally have been seen, and

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<sup>26</sup> Transcript, page 275

<sup>27</sup> Transcript, page 274

<sup>28</sup> Transcript, pages 278-279

<sup>29</sup> Transcript, pages 279-280

<sup>30</sup> Transcript, page 283

corrective action accordingly taken, but Dr Parkin acknowledged that in some people it is difficult to see the entry into the larynx. Dr Parkin believed that it was possible that the tube had been situated above the larynx or even displaced into the pharynx but it simply wasn't seen in either position. Dr Parkin perhaps somewhat generously suggested that because Matthew had been a difficult intubation it may have been difficult to see the entry of the tube into the larynx. The evidence would suggest, however, that Matthew had not been a particularly difficult intubation.

- 4.10. Dr Parkin was specifically asked whether there was any available explanation by which the incorrect positioning of the ETT may have reasonably gone unnoticed. To this he said that not seeing the displacement of the cuff above the laryngeal cords was not 'terrible on its own'<sup>31</sup>, but that the combination of bile coming out of the endotracheal tube and the unremitting fall in the oxygen level and the failure to respond to ventilation with 100% oxygen demanded some action. The combination of those factors considered together amounted to a statement that there was an ETT malfunction of some kind and that there was a definite need to reintubate the patient notwithstanding that the laryngoscopy that had already taken place suggested that the ETT was in the correct position<sup>32</sup>. Dr Parkin believed that it was clear that there was some pneumatic problem taking place with the ETT despite Dr Bangia's laryngoscopy<sup>33</sup>.
- 4.11. Given all of that, and given that the oxygen levels did not at first fall to unsurvivable levels probably because Matthew was breathing spontaneously on his own, Dr Parkin was of the view that there had been a long window of opportunity to have rectified the difficulty. Until approximately 1:00am, when Matthew deteriorated rapidly, Dr Parkin believes that he probably would have survived the episode<sup>34</sup>. He believed that he had 'a good chance of recovery right up until around about 1 o'clock'<sup>35</sup>. Dr Parkin believed that the vecuronium administered at 1:00am, and the resulting paralysis, was 'the straw to break the camels back'<sup>36</sup>. With an incorrectly positioned ETT, paralysis

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<sup>31</sup> Transcript, page 283

<sup>32</sup> Transcript, page 283

<sup>33</sup> Transcript, page 284

<sup>34</sup> Transcript, page 287

<sup>35</sup> Transcript, page 288

<sup>36</sup> Transcript, page 292

could be catastrophic insofar as it robbed Matthew of any ability to self ventilate. It may have taken away Matthew's 'last defence' in Dr Parkin's opinion<sup>37</sup>.

- 4.12. On questioning by Matthew's father Mr Brian Lynn, Dr Parkin expressed the belief that the acute abdominal distension that was noticed at 1:10am would raise the possibility at that point in time of actual oesophageal intubation, which in fact was detected by Dr Jackson 15 minutes later at 1:25am.
- 4.13. Dr Parkin suggested that the question of intubation in a clinical context should be continuously reviewed. One would be examining the chest as to whether it is expanding or not, monitoring oxygen levels, detecting the exhalation of carbon dioxide if capnography were in place, and that any acute event indicating the possibility of intubation in the oesophagus should invite immediate review<sup>38</sup>. If capnography had been so utilised, the outcome may have been different in this case because there would have been an expected and typical fall in the volume of carbon dioxide excreted through Matthew's breath in all of the circumstances. Dr Parkin indicates in his report that this would signal to an alert user either that the global ventilation was falling or carbon dioxide was being lost around the ETT tube.

## **5. Conclusions**

- 5.1. Matthew Lynn's ETT had been correctly positioned until approximately 12:20am on 23<sup>rd</sup> January 2005 when he experienced an episode of agitation and vigorous movement that involved among other things forceful coughing. As a result, the ETT became displaced. I do not think it is likely that the ETT was displaced into the oesophagus at that stage. There is no evidence that the cuff of the ETT had been incorrectly inflated or had become deflated. To my mind the probability is that the ETT had been displaced in an upward direction such that the cuff of the tube was at or above the larynx so that there was no longer a pneumatic seal between the tube and the trachea. This had two effects in my view. Firstly, it meant that Matthew was receiving imperfect ventilation, albeit some ventilation, and secondly, it allowed the aspiration of stomach contents past the cuff into Matthew's lungs which in turn resulted in stomach contents being conveyed through the endotracheal tube. The net result of all of this was that Matthew failed to receive adequate oxygenation and his oxygen saturation levels descended to unsatisfactory, and indeed, alarming levels.

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<sup>37</sup> Transcript, page 290

- 5.2. In my opinion, when Dr Bangia utilised laryngoscopy to check the position of the ETT it was probably incorrectly positioned in the site that I have described in the preceding paragraph. Although it cannot be established with certainty, it is probable that the cuff was visibly situated at or above the larynx. For reasons that are not clear, and which do not necessarily imply any degree of neglect on his part, Dr Bangia failed to observe that. I unhesitatingly find that Dr Bangia had honestly believed that the ETT was correctly positioned. Given Dr Bangia's experience, in my view it is highly unlikely that if at that time it had actually been positioned in the oesophagus he would have failed to detect it. This to my mind provides a strong indication that the ETT was not positioned in the oesophagus at that point in time. If it had been so positioned, it would have been readily visible to an experienced clinician such as Dr Bangia.
- 5.3. Notwithstanding Dr Bangia's belief that the ETT was correctly positioned, Matthew Lynn's continued unfavourable presentation and failure to respond to all measures provided powerful evidence to the contrary. The aspiration of Matthew's stomach contents through the ETT did not resolve. Nor did his oxygen saturation improve despite his being administered 100% oxygen. There was later improvement to a level of approximately 93% that might have provided some temporary reassurance in itself, but in the context of what had occurred before and what occurred with Matthew afterwards it seems that little comfort could have been derived from that fact. In my view, in spite of Dr Bangia's visualisation of the tube and his stated belief at the time that it was correctly positioned, there was evidence to suggest that the tube was incorrectly positioned and that therefore further consideration ought to have been given to Matthew's reintubation before 1:00am.
- 5.4. At approximately 1:00am Dr Bangia ordered 8mg of vecuronium to be administered to Matthew Lynn. The decision to administer this was based upon a false premise that the ETT was correctly positioned. The administration of vecuronium had a paralytic effect on Matthew Lynn such that he was no longer able to derive any benefit from his own ability to respire. As a result, Matthew Lynn's deprivation of oxygen was made even more acute. He consequently became bradycardic and he suffered a cardiac arrest.

- 5.5. Meanwhile Dr Christopher Jackson had arrived at the scene. Dr Jackson had relied on assertions that the ETT had been found by Dr Bangia to be in the correct position. Those assertions and Dr Jackson's own examination by way of auscultation led him to deal with the situation on the basis that the tube was correctly positioned.
- 5.6. When Matthew Lynn experienced a cardiac arrest, CPR was administered by way of hand ventilation and chest compressions to which Matthew failed to respond.
- 5.7. At approx 1:10am it was observed that Matthew's stomach had become significantly and noticeably distended. At the same time, Matthew experienced faecal incontinence. At first, no person present drew the available conclusion that the stomach distension was the result of delivery of air through an incorrectly situated ETT within the oesophagus. Efforts at CPR continued with no positive effect until approx 1:25am when it was suggested by a nurse that the ETT may not have been correctly positioned after all. At that point, Dr Jackson visualised the ETT using laryngoscopy and discovered that the ETT was situated in the oesophagus. Dr Jackson immediately reintubated Matthew Lynn by inserting a tube into the trachea.
- 5.8. After reintubation, Matthew immediately responded positively to proper ventilation, and as a result, his heart returned to a normal rhythm following defibrillation.
- 5.9. I infer from Matthew Lynn's rapid response to reintubation that there had, all along, since 12:20am, been an incorrectly positioned ETT. I am not certain as to what point in time it had become displaced within the oesophagus. All that can be concluded is that this event occurred sometime between Dr Bangia's visualisation of the ETT and Dr Jackson's visualisation of the ETT.
- 5.10. As a result of the incorrect positioning of the ETT, and the failure to detect it before 1:25am, Matthew Lynn suffered an episode of significant and sustained hypoxia that ultimately resulted in permanent and fatal brain damage. Matthew Lynn ultimately was declared brain dead and died on the 27<sup>th</sup> January 2005 from hypoxic encephalopathy.
- 5.11. While the ETT was incorrectly positioned within the oesophagus, CPR that included hand ventilation was rendered futile in the sense that Matthew's lungs were simply not benefiting from any of the ventilation that was being administered as part of the resuscitative process.

5.12. I accept Dr Parkin's assessment of the situation that in spite of Matthew Lynn's descending oxygen saturation levels, he was retrievable up to approximately 1:00am and probably would have survived the experience had appropriate action by way of reintubation been taken at or before that time. However, once vecuronium was administered with its resulting paralytic effect, Matthew's fate was at that point probably sealed unless very prompt action was to be taken to reintubate him. In the event, reintubation did not occur for another 25 minutes. The reason for this failure was the continuing belief, as engendered by Dr Bangia's assertions, that the ETT was still correctly positioned. In my opinion this continued belief was not reasonable in the circumstances as there was a powerful body of evidence to the contrary. I do not say that critically in relation to nursing staff. The evidence that the ETT was incorrectly positioned was further strengthened at 1:10am when Matthew's stomach was seen to be significantly distended. A recheck of the position of the tube by way of laryngoscopy should undoubtedly have taken place at that time. If it had taken place, a further 15 minutes of cardiac arrest and severe hypoxia probably would have been avoided. I observe here that, to his credit, Dr Jackson had no hesitation in accepting his share of responsibility for a failure to reintubate at that point in time. Dr Jackson accepted that the 15 minute delay between the observation of Matthew's stomach distension and his revisualising the ETT was, to use his own description, 'extraordinary, frankly'<sup>39</sup>. There is no escaping the conclusion that the additional 15 minutes of hypoxic downtime was manifestly avoidable. Dr Jackson told me this:

'In terms of my own agonising over those events and trying to reappraise what happened, my account for my own behaviour was that I really just accepted that the tube was in the right place, because someone who I perceived to be a bit senior to me had said 'No, the tube's in the right place'. In hindsight a culture of crosschecking would have been a really smart thing to have, and it would have been much better management for me to have done direct laryngoscopy, regardless of what I had been told, to establish the facts for myself.'<sup>40</sup>

It is hard to disagree with those observations. Having seen Dr Jackson give evidence, I conclude that Dr Jackson spoke with genuine regret. In his evidence, Dr Jackson expressed the view that Matthew may already have received a severe neurological injury even prior to 1:00am when he arrived. However, he acknowledged that if he

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<sup>39</sup> Transcript, page 226

<sup>40</sup> Transcript, page 226

had been reintubated at that point in time, he probably would not have suffered the cardiac arrest from which much of his pathology followed. He postulated another possibility, namely that Matthew may have only experienced a partial neurological recovery even if there had been earlier reintubation. I have carefully considered all of this, but I prefer the evidence of Dr Parkin that Matthew probably would have survived if he had been reintubated as late as 1:00am. I say this because it seems clear that much of Matthew Lynn's hypoxic insult must have occurred after he experienced his cardiac arrest, especially when regard is had to the fact that efforts at CPR would have been rendered futile by virtue of the imperfectly positioned ETT during those efforts. Less clear is whether Matthew would have totally avoided a neurological deficit had he not experienced the cardiac arrest. All that can be said is that his chances of surviving the experience without any deficit clearly would have been enhanced if early reintubation had occurred.

- 5.13. I accept Professor Bersten's evaluation of the situation, namely that Matthew was on the road to recovery prior to this intubation episode and would have survived the injuries sustained in the incident at Robe but for this episode.
- 5.14. In my opinion, Matthew's death could have been prevented had there been in existence a culture of cross checking ETT positioning in circumstances where an issue had arisen as to its correct positioning. Clearly there was in this instance a significant issue as to this and it was an issue that existed for an extended period during the course of the incident.
- 5.15. Matthew's death would in all probability also have been prevented had capnography been deployed, even on a non-continuous basis, once it was suspected that his difficulties were the result of a poorly positioned ETT. It probably would have revealed an unsatisfactory level of expulsion of carbon dioxide which would have provided further evidence that Matthew's intubation was imperfect. Dr Jackson put it this way:

'had continuous capnography been on Matthew at the moment that I walked in at 1 o'clock, without regard to anything that had happened for the past half hour, I would have looked up, I would have seen no carbon dioxide coming back from Matthew and I would have said straightaway, regardless of how tired I was, how misled I was by Ravi's assertion about the laryngoscopy or any other factors, I would have looked at that and

said 'Well hang on, we need to have another look'. I think that would have made a big difference.'<sup>41</sup>

I accept that evidence.

## **6. Recommendations**

- 6.1. In Dr Parkin's report he delivers a strong commentary as to the utility of capnography in a setting such as this. He asserts that capnography is now a standard part of ICU monitoring and that it might have been expected to be in place here. He points out that capnography is mandated in anaesthetic environments. Dr Parkin believes that there is a public interest to be served in promoting the use of capnography as a routine measure if for no other reason to ensure that an incident such as the one that involved Matthew Lynn was never repeated. I agree with that sentiment. I have already referred in these findings to the question of capnography. It was not utilised in Matthew's case either on a continuous basis or on an as required basis. Dr Parkin drew the Court's attention to a document entitled 'Minimum Standards for Intensive Care Units' promulgated by the Joint Faculty of Intensive Care Medicine which is an amalgam of the Australian and New Zealand College of Anaesthetists and the Royal Australasian College of Physicians. The date of the current version of the document is October 2003. It was tendered to the Inquest<sup>42</sup>. Paragraph 9.2.2 of the document states that '*Respiratory function should be assessed at frequent and clinically appropriate intervals by observation, supported by capnography and blood gas analysis.*' Paragraph 9.3.9 stipulates '*End tidal CO2 monitor – Capnography must be available at each bed in the Intensive Care Unit and must be used to confirm tracheal placement of the endotracheal or tracheostomy tube immediately after insertion.*' I did not understand these requirements to dictate continuous capnography in situations other than surgical or for general anaesthesia. As well, the stipulations appear to relate more to the checking of the position of an ETT or tracheostomy immediately after insertion. While I think it is a long bow to draw to suggest that the situation that prevailed in Matthew's case was contrary to any particular guidelines as they then existed, this is not to say that where an issue arose as to the correctness of the positioning of an ETT that it would not have been good practice to utilise capnography as another means of checking. The Court can only point to the fact that

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<sup>41</sup> Transcript, page 247

<sup>42</sup> Exhibit C41b

Matthew's death probably would have been avoided if it had been utilised in his case. Dr Parkin would suggest that paragraph 9.3.9. of the Joint Faculty document could be amended to include a stipulation that capnography should be used to confirm tracheal placement of an ETT during its use as well as immediately after insertion.

- 6.2. Professor Bersten told me that in January 2005 continuous capnography was available in FMC ICU but was not necessarily available for all ventilated patients. He suggested that the protocols that existed at the time of this incident operated in respect of the checking of intubations. In Matthew's case continuous capnography had been utilised during his transport and it had been used for the first three days of his admission during which he had an intracranial pressure monitor in situ. Professor Bersten believed that the capnography was ceased in Matthew's case because it was not routine at that time to use it with respect to all intubated patients in all circumstances.
- 6.3. Professor Bersten pointed out that capnography, while effective when utilised to detect carbon dioxide in order to confirm correct positioning of an ETT, is not totally foolproof. That said, Professor Bersten was of the opinion that in general it is a good monitor and one that will be increasingly used. Professor Bersten suggested that in any event the Easy-Cap method of monitoring on an as required basis had been available for a number of years and he himself had been encouraging the doctors to use it in the context of confirming correct endotracheal intubation. In the light of that, it seems astonishing that it was not utilised in Matthew Lynn's case.
- 6.4. Professor Bersten explained to me that there had been a number of changes in capnography practices in the FMC ICU since these events. The unit now has two rapidly responding continuous machines with rapid warm up times that are immediately available. There are plans for a new monitoring system that would equip every bed with capnography and that this should be available by approximately December 2010.
- 6.5. There was some debate during the course of the Inquest about the appropriateness and effectiveness, or otherwise, of cross checking endotracheal intubation. It is difficult to conceive of any sensible objection to the notion that in situations where there is a degree of clinical uncertainty as to whether an ETT is correctly positioned, cross checking as between clinicians ought to be actively encouraged.

- 6.6. Dr Jackson also suggested as a sensible precautionary measure that laryngoscopy ought to be undertaken immediately after the administration of a paralysing agent such as vecuronium, regardless of the clinical situation prior to the administration of that drug. The same could be said in relation to capnography being undertaken immediately after the administration of a paralytic agent.
- 6.7. Dr Jackson also raised with the Court the impact of professional fatigue in medical practitioners. After these events Dr Jackson checked his calendar for the week preceding this incident and established that the event had occurred during his fourth 15 hour night shift in 8 days. This meant that he had performed about 70 hours of work in the preceding 160 hours. To a certain extent conditions within FMC ICU have since these events been ameliorated by the fact that it now has three doctors on the floor instead of two. Dr Jackson acknowledged that the interaction between fatigue and medical error is a very complex issue. This Court has also acknowledged this on occasions in the past. It is a matter that obliquely arose during the course of this Inquest and was only explored at a superficial level. It is therefore a matter upon which the Court is unable to make any definitive comment beyond making the observation that the course of Matthew Lynn's management during this crisis may have been contributed to by fatigue.
- 6.8. By virtue of section 25(2) of the Coroners Act 2003 the Court may add to its findings any recommendation that might, in the opinion of the Court, prevent, or reduce the likelihood of, a recurrence of an event similar to the event that was the subject of the inquest.
- 6.9. I make the following recommendations:
- (1) That the Minister for Health draw this case to the attention of the Chief Executive Officers, or equivalent, of all public hospitals in South Australia with a view to the promulgation and establishment of a culture among medical practitioners that involves cross-checking, by way of laryngoscopy, of the positioning of endotracheal tubes in situations that involve clinical uncertainty as to their correct positioning.
  - (2) That the Minister for Health cause steps to be taken within all public hospitals in South Australia to institute capnography on a continuous basis in respect of all

intubated patients, and especially in situations involving the administration of a paralytic agent to those patients.

(3) That the Minister for Health cause steps to be taken within all public hospitals in South Australia to ensure that in all situations that involve clinical uncertainty as to the correct positioning of an endotracheal tube, capnography is utilised to check whether the tube is correctly positioned.

(4) That the Minister for Health cause steps to be taken within all public hospitals in South Australia to encourage the use of laryngoscopy to check the positioning of an endotracheal tube immediately following the administration of a paralytic agent to the intubated patient.

(5) That the Minister for Health draw these findings and recommendations to the attention of the Chief Executive Officers, or equivalent, of all private hospitals in South Australia with a view to their giving consideration to the subject matter of the within recommendations.

(6) That these findings and recommendations be drawn to the attention of the Joint Faculty of Intensive Care Medicine (Australian and New Zealand College of Anaesthetists and the Royal Australasian College of Physicians) for its consideration and necessary action.

## **7. The donation of Matthew Lynn's organs for transplantation**

7.1. Finally, it is appropriate to draw to the attention of the general public the following extract from Mr Lynn's final address to the Court:

'Our family, including Matthew, have always been supportive of organ donation and so we informed the doctors that if, at the very worst, Matthew passed away, we wished to offer his organs for donation.

And so – might I say, Matthew was a fighter and it took several days for the little spark of brain activity that was present and precluded a death notice – it took several days and many goodbyes, but eventually he was pronounced dead and his organs were harvested for donation.

Just as an aside, the ability to donate was one of the joys that came out of this sorry incident and I would commend any person, who is put in our position, to take up that offer - it made Matthew's death mean at least something a little bit more'<sup>43</sup>.

*Key Words: Motor Vehicle Accident; Hypoxia; Incorrectly positioned endotracheal tube*

*In witness whereof the said Coroner has hereunto set and subscribed his hand and*

*Seal the 31<sup>st</sup> day of December, 2009.*

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*Deputy State Coroner*

Inquest Number 21/2009 (0288/2005)

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<sup>43</sup> Transcript, page 349