CORONERS FINDINGS

PLACE INQUEST HELD: Brisbane
DATE: 4 May 2005

This is the inquest into the death and circumstances of death of **Jacinta Kate Robinson.**

1. I must deliver my findings pursuant to the provisions of the *Coroners Act 1958.* I do so, reserving the right to revise these reasons should the need or the necessity arise.

2. The purpose of this inquest, as of any inquest, is to establish, as far as practicable –

- The fact that a person has died:
- The identity of the deceased person; and
- Whether any person should be charged with any of those offences referred to in section 24 of the Act.
- Where, when and in what circumstances the deceased came by her death

3. It should be kept firmly in mind that an inquest is a fact finding exercise and not a method of apportioning guilt. The procedure and rules of evidence suitable for a criminal trial are not suitable for an inquest.

4. In an inquest there are no parties; there is no charge; there is no prosecution; there is no defence; there is no trial. An inquest is simply an attempt to establish facts. It is an inquisitorial process, a process of investigation: These observations were confirmed by Justice Toohey in *Anetts v McCann* ALJR at 175.

5. A Coroner's Inquest is an investigation by inquisition in which no one has a right to be heard. It is not inclusive of adversary litigation. Nevertheless, the rules of natural justice and procedural fairness are applicable. Application of these rules will depend on the particular circumstances of the case in question.

6. In making my findings I am not permitted, under the Act, to express any opinion, on any matter which is outside the scope of this Inquest, except in the form of a rider or recommendation.

7. The findings I make here are not to be framed in any way which may determine or influence any question or issue of liability in any other place or which might suggest that any person should be found guilty or otherwise in any other proceedings.

8. All proceedings before this Court are sad proceedings. At this stage I express my sympathy and condolences, and that of the Court, to the family of the deceased in their sad loss, in the tragic death of Jacinta Robinson. She was brave little girl who endured much suffering in her life and her family continues to miss her terribly.

Summary of the evidence.

Jacinta Kate Robinson was born on 16 March 1995. She died on 26 September 2002 in the surgical ward of the Royal Children's Hospital in Brisbane. She was seven years old. After her birth it was discovered that Jacinta had multiple problems. She suffered from spina bifida as well as bowel and bladder incontinence. She had more than thirty procedures performed during her lifetime. She was admitted to the Royal Children's Hospital on 2 September 2002 for a bladder procedure performed by Dr Peter Borzi. That surgery proceeded uneventfully and she was discharged home on 4 September 2002.

Jacinta became unwell with abdominal pain and vomiting on 12 September 2002. Her father took her to the emergency department of the hospital and she was admitted to the surgical ward. Diagnostic testing was performed and a diagnosis of a bacterial infection was made requiring a week's intravenous antibiotics. She was discharged home again on 20 September 2002. Early the next morning, she woke with severe vomiting and back pain. She was taken back to the emergency department and re-admitted.

Her usual treating specialist was away on leave and Jacinta was placed under the care of the surgeon, Dr Roy Kimble. After more diagnostic tests Jacinta was diagnosed with a bowel obstruction and a perforation of the ileum, the end section of the small bowel near the colon. Adhesions were blocking the bowel due to the multiple previous surgeries. On 24 September Jacinta underwent a laparotomy to divide the adhesions and repair the perforation of the ileum. This operation was performed between 4pm and 7.20pm on 24 September by Dr Kimble, assisted by Dr Bryant. There were two anaesthetists, Doctor Webb and Dr Acworth.

During this operation the anaesthetist Dr Acworth inserted a central venous line into the jugular vein in the right side of the neck. This was to enable nutritional fluids known as total parenteral fluid to be administered to Jacinta in the post operative phase. Jacinta had been ill for sometime and was significantly underweight and it was necessary to provide this support.

At about 9pm Jacinta was transferred to the paediatric intensive care unit where she remained overnight until she was transferred to the surgical ward at about 10.00am on 25 September 2002. She was under hourly observations on the ward and chest and abdominal x-rays were taken that day. The x –ray confirmed the position of the central venous line at the junction of the right atrium and the inferior vena cava.

At about 11.00pm on the evening of 25 September 2002 Jacinta's pulse rate was one hundred and seventy (170), but then dropped back to one hundred and forty (140).

Registered Nurse Justin Hatch was caring for Jacinta that night. After midnight, when he was performing observations on Jacinta he found that she was alert but he could not find a blood pressure. Two other nurses attended to help him, namely Registered Nurse Deborah Jenkins and Clinical Nurse Jacqueline Sey. They also could not obtain a reading and the on call doctor was paged. Dr Kieran Bigby attended at 1.30am. Jacinta was still alert but looking pale. She had dry lips and was appearing distressed indicating to Dr Bigby she had a pain in her stomach.

Dr Bigby examined Jacinta and attempted to obtain a blood pressure, also without success. He telephoned his registrar, Dr Kim Robertson who was in the emergency department. He was advised to administer intravenous fluids. Dr Bigby did so and also took a sample of blood for further investigation. Shortly after this Jacinta became difficult to arouse and then completely unresponsive. Dr Bigby asked the nurse to activate the medical emergency response team. Dr Robertson arrived very quickly and shortly afterwards, Dr Bryn Jones. Resuscitation attempts were made until 2.08am when it was decided that it was not possible to resuscitate Jacinta. Dr Jones' statement was provided to the police by 5.30 that morning.

A post mortem autopsy examination was performed by Dr Guy Lampe on 27 September 2002. He identified the cause of death to be cardiac tamponade caused by the leaking of total parenteral fluid into the pericardial sac as a consequence of the central line therapy.

Jacinta's mother, **Jacqueline Robinson** gave oral evidence before this inquest as well as providing her sworn statement. She confirmed that Jacinta had been born with significant problems and undergone more than thirty procedures during her life. Despite this, Mrs Robinson said that Jacinta lived an active and happy life fully involved with school activities.
During Jacinta's last admission Mrs Robinson was present at the hospital to a large extent. She recalled her daughter requiring pain relief but that it was not effective. Mrs Robinson had been intimately involved in her daughter's care since birth including the catheterization of the bowel three times a week which was a procedure required to clear the bowel. In the two weeks prior to Jacinta's admission Mrs Robinson had been unable to catheterize the bowel and the family suspected a blockage. Mrs Robinson clearly thought that there was a delay in reaching a proper diagnosis of bowel blockage (rather than a kidney infection.) She said it was not until Dr Kimble was called to see Jacinta on 23 September that a bowel obstruction was diagnosed. Mrs Robinson was with Jacinta after she was returned to the Surf ward from Intensive Care. During the day of 25 September her mother recalls thinking that Jacinta was picking up. She then remembers Jacinta being very thirsty and agitated at about 11.30pm. She recalls that it was 1.30am when a doctor from emergency, (Dr Bigby,) came to see Jacinta. At this time Jacinta was hot but her chest was cold and clammy. Jacinta then suddenly fell back onto her pillows and Mrs Robinson was asked to leave the room while the staff worked on her daughter. More help arrived but at two thirty that morning Mrs Robinson was told her daughter Jacinta had died.

Mrs Robinson confirmed to Mr Boddice, representing Queensland Health, that Jacinta had been unable to hold down a normal diet during the eight day admission from 12 to 20 September 2002.

Registered Nurse Hatch was taking care of Jacinta on the evening of 25 September, as well as two other patients. At the beginning of the shift he said Jacinta was very alert and responsive. Nurse Hatch had looked after Jacinta the pervious night in the intensive care unit and was aware of her history. He recalls Jacinta wanting to sit up in the bed and staff changing bedding to do this. During this, Jacinta crawled up the bed to help. He also remembered that Jacinta wanted water to drink.

The first set of observations was taken about twenty five minutes after midnight. Nurse Hatch could not get a reading and asked for assistance of the nurse in charge and another nurse. No reading for blood pressure was obtained. Nurse Hatch thought that because Jacinta was alert and talking there was no cause for concern He did record that her peripheries were cool and that the radial pulse and pulse in her feet was very faint. He confirms that Nurse Sey tried to page the ward call registered medical officer but did not get an immediate response. He recalls it was five minutes before the second call was made. During this time Jacinta indicated she was hot and kicked off her blankets and asked for water. Her temperature was thirty eight degrees at ten to one that morning, down a fraction from the reading ten minutes before.

When they received no response from the ward call doctor, a call was put through to emergency medicine and the resident doctor was spoken to. Nurse Hatch says he took Jacinta's temperature again at 1.00am but did not record this as he was occupied with the intravenous fluid machine. Her peripheral pulse was very faint but he could find her pulse rate with a stethoscope.

At 1.30am the registered medical officer arrived and ordered blood to be taken for testing. As this was happening Jacinta complained of being hot and of back pain. She again asked for water. Her mother was present at the bed.
The doctor went to a phone to speak with another doctor and then ordered haemacel. It was at this time that Jacinta suddenly lost consciousness and the emergency response team was called. The doctor ordered that saline be administered via the central line as quickly as possible. The emergency response team arrived and took over resuscitation. Nurse Hatch participated in these attempts including administering two syringes of haemacel.

In relation to the evening of 25 September Nurse Hatch did not think that Jacinta's condition was critical until about 1.00am when her peripheral pulses were very faint. Dr Bigby did not arrive until 1.30 am and Nurse Hatch says there was no clinical change in Jacinta's condition during this time. As with Nurse Sey, Nurse Hatch relied on Jacinta continuing to be alert and interactive as a sign that there was no need to call for a medial emergency.

The records indicate the MERT personnel arrived at one fifty and resuscitation attempts continued until between eight minutes and thirteen minutes past two.

Nurse Hatch also had heard of tamponade but had no real understanding of the term. He was unaware and untrained concerning the signs of cardiac tamponade.

Clinical Nurse Sey qualified in 1995 and has worked predominantly with children. She was the nurse in charge of Surf ward on the evening of 25 September 2002 from 9.00pm until 7.30am. She had supervisory responsibility as well as three or four patients. She recalled the verbal handover indicating that Jacinta had returned from intensive care after a laparotomy. She was receiving TPN fluid and had a morphine infusion in place.

Nurse Hatch reported to Clinical Nurse Sey at about 11.20 pm that Jacinta's heart rate was high, up to 170 beats per minute. Nurse Hatch said Jacinta was denying pain and

was able to move freely. Nurse Sey says at that time she telephoned the ward call doctor. She paged the doctor and he returned the call and Jacinta's situation was discussed. She cannot recall the name of the doctor at the time. During this conversation Nurse Hatch indicated the pulse rate had returned to normal and this was relayed to the ward call doctor. Nurse Sey said she requested a review of Jacinta when the doctor was able to attend. There was no indication of when the doctor would be able to attend. Shortly after this Jacinta's bed needed changing and Nurse Sey was present. She noticed that Jacinta looked pale but moved freely to allow staff to change the bed. She did not complain of pain at this time and asked for something to eat and drink.

A short time after this Jacinta complained of back pain. Registered Nurse Hatch informed Nurse Sey that Jacinta had now had a bradycardic episode with only 70 beats per minute. There was uncertainty about this reading. Nurse Sey checked Jacinta's heart rate with a stethoscope and the reading was 140 beats per minute but no blood pressure reading could be obtained. This occurred despite two different machines being used on different limbs. A manual attempt also could not obtain a reading. Nurse Sey noticed she was peripherally cool but centrally warm and febrile with a temperature of 38 degrees Celsius. Despite this, Jacinta was still awake and talking. Records indicate this was about 12 .30am.

Nurse Sey rang the ward call doctor a second time, but this time there was no response, so she contacted emergency looking for the ward call doctor. It was a couple of minutes between these calls but she could not put a time on this call. Nurse Sey clearly thought it was a matter that needed to be reviewed by the doctor but because Jacinta was talking to her and not indicating any distress at the time, she thought it was probably a problem with the machine rather than a significant medical issue. Jacinta's heart rate (via the stethoscope) was fine.

Nurse Sey could not explain the hour's delay between not being able to obtain a reading and the doctor attending. In court she could not recall being aware that it was such a lengthy period of time. She said it was sometimes the case that a call would take that length of time to respond to.

The ward call doctor arrived at emergency and then came straight to see Jacinta. (This was at 1.30am.) Nurse Sey says blood was taken from the central line and haemacel was ordered. Jacinta stopped responding to verbal questions and the resuscitation trolley was brought and the bag and mask hooked up. Nurse Sey rang intensive care and a nurse came immediately with the haemacel.
The medical emergency response team was called via switch, and, upon their arrival, took over Jacinta's resuscitation. Jacinta's mother was waiting in the kitchen of the ward. When Jacinta had died the nurse manager and social worker were called in to offer support to Mrs Robinson and her family.

Nurse Sey was asked to consider whether, with the benefit of hindsight, she should have considered calling the medical emergency response team when Jacinta's blood pressure could not be obtained. But Nurse Sey said that Jacinta's physical appearance and behaviour did not indicate that there was a serious problem.

Nurse Sey did not have any in depth understanding or appreciation of cardiac tamponade. She could not state signs to indicate the possibility of cardiac tamponade and she had not received any training concerning this condition. She acknowledged that children in the ward frequently had central venous lines, at least one patient per day.

There had been no training provided to nurses (to the knowledge of Nurse Sey) about cardiac tamponade since Jacinta's death

Nurse Sey was asked to look at the overall observation of blood pressure from midday on 25 September. It was established that Jacinta's readings fluctuated but Nurse Sey said that this could be explained for many reasons, including pain and activity level.

Dr Richard Bryant was the doctor who examined Jacinta on 14 and 15 September. He was a second year training registrar at the time. His statement is clear that at the time of his examination he did not diagnose bowel obstruction although it was possibly a condition that was developing. He stated there was nothing to indicate the urgent requirement for surgery at that time. Conservative treatment was indicated in the hope that Jacinta would be one of the ninety percent of patients whose bowel condition resolved spontaneously with out the need for surgery. He later saw Jacinta on 24 September at which time her symptoms had worsened. Dr Kimble had diagnosed bowel obstruction. The family were informed by Dr Kimble with Dr Bryant being present when the need for TPN was discussed. This was explained as being the means by which Jacinta could be properly nourished while her bowel recovered.

The surgery proceeded without any apparent problem, including the initial insertion of the central venous line. On the afternoon of 25 September Doctors Kimble and Bryant did a ward round and reviewed Jacinta's condition. Dr Bryant noted that this was not recorded in the chart. He explained the practice of one record per day. He recalls that Dr Kimble ordered the TPN to be commenced. Dr Bryant also recalls having been informed by the intensive care staff that the chest x ray had confirmed the appropriate position of the central line.

DR Bryant's opinion was that Jacinta's observations post surgery were unremarkable considering her history and the recent surgery.

Dr Julie McEniery, was an intensive care specialist on call in the early hours of 26 September 2002. At about 2.30 am she received a call to indicate there had been an unexpected cardiac arrest and unsuccessful resuscitation of a child. She immediately went to the hospital and reviewed the record. She could not determine the cause o f death and arranged for the surgeon and social worker to be called and the police informed and a report to the coroner.

She assisted the court with explaining the anatomy of the heart. The right side of the heart pumps blood through to the lungs and the left side pumps blood to the body. The muscle wall on the right side of the heart is not as strong as that on the left side, (which pumps blood throughout the body.)
She also explained that the heart is covered with a membrane called the pericardial sac. A small quantity of fluid exists between the membrane and the heart normally.

Any large amount of fluid that is found in this space is called a pericardial effusion. If this builds up excessively it causes pressure which interferes with the heart's ability to pump. A large collection of fluid is a life threatening situation known as a cardiac tamponade.

Dr McEniery identified the signs of tamponade as;
Tachycardia as the heart starts becoming compressed.
As time passes and the pressure increases the heart will not beat as strongly as the blood pressure will decrease. Pulses in the body will be weaker.
The skin might become paler and cooler.
As time passes the body partly compensates until very suddenly the body reaches a critical stage where there is insufficient blood (and oxygen) being transported through the body. A general collapse, loss of consciousness difficulty breathing and cardiac arrest all ensue very rapidly.

There was a discussion of the signs of tamponade- many of them being non specific. A high venous pressure and low arterial blood could also indicate tamponade, but might also indicate other conditions.

The principal tool for accurate diagnosis is echocardiogram. This directs sound waves which will bounce off different material and can differentiate between solid and fluid masses. The appearance of an enlarged heart (in fact the cardiac silhouette including the pericardial sac distended with fluid) can be revealed by x-ray and might also point towards the possibility of tamponade.

If a diagnosis is made the treatment is to drain the fluid from the pericardial sac. Providing intravenous fluids might also buy a little time by strengthening the heart beat with additional fluid in a temporary basis. That would be counter indicated if there was a traumatic rupture of the heart where additional fluid would enter the pericardial space.

Dr McEniery also provided information about the placing of central venous lines, particular through the jugular vein as in this case. Once this is placed, a chest x ray is performed to check the position of the line in the heart. This was done at 9 30 am on 25 September for Jacinta and stated that the tip of the right side central venous line was at the junction of the right atrium and the inferior vena cava. The line is passed through the internal jugular vein into the superior vena cava. It then goes through the junction of the vena cava with the right atrium into the right atrium which is the upper chamber of the heart. It stops at the junction with the inferior vena cava and the right atrium. At the time of the x ray the cardiac silhouette was normal, in other words it did not reveal leaking up at that time of any fluid into the pericardial sac.

The x ray report was printed at 10.59am on 26 September , i.e. after Jacinta had died. However, Dr McEniery's evidence was that the doctors can access the results digitally before it is printed. This had been done when the radiologist attended the intensive care unit and they review all x rays. This is not charted, possibly because by this time Jacinta had left the intensive care unit for the ward and her notes had gone with her and the computer record would have been closed in intensive care.

Dr McEniery stated that the practice in the Children's Hospital was to accept the position of a central line between the superior vena cava and the inferior vena cava.- anywhere down from within the superior vena cava down into the right atrium to the junction of the inferior vena cava. She explained that because of the smaller size of a child it is more difficult to pinpoint the positioning of the tip of the catheter. It is also difficult to withdraw and reposition the catheter, particularly because of the dimensions of a child's neck where the outer part of the catheter must be secured. If a catheter is moved there is increased risk of infection

It was acknowledged that, as with all catheters there is a degree of risk that the tip will sit up against the wall of the heart, with a risk then of perforation of the tissue it is in contact with.

Dr McEniery explained that where a nurse required medical review or advice for a patient during the night, there were two doctors rostered, namely one resident and one registrar. Additionally there is a resident who is always in intensive care.

There is no radiologist or radiographer in the hospital after about 10.30 or 11.00pm but they are available on call if required. If cardiac tamponade was suspected then the radiologist could have confirmed this with an echocardiogram, but Dr McEniery was of the opinion that a paediatric cardiologist would be required to further diagnose where the catheter was or how the fluid build up had occurred. Had it bee recognised and the development been slower then the Royal Children's Hospital would have called upon the expertise of a paediatric cardiologist from Prince Charles Hospital. That person could have attempted to drain the tamponade by inserting a needle, (guided by ultra sound.)

It was several times a week that Dr McEniery said that the expert guidance and opinion of a cardiologist was called upon from the Prince Charles Hospital, (not necessarily just in relation to a tamponade situation.) A cardiologist attends regularly each Monday and Friday, and also for emergency situations.

Dr McEniery reviewed the chart with the observations for the twelve hours before. She was of the view that although the heart rate was up, this could easily have been interpreted as consistent with Jacinta having a temperature and being in post surgey period. The blood pressure she said was normal and there was no ability once Jacinta was returned to the ward to monitor venous pressure.

In the few hours leading up to Jacinta's death Dr McEniery agreed that the inability to obtain blood pressure was a sign that the nurses should seek medical review. However, Dr McEniery thought it would have had to be a very prompt and informed response to have diagnosed cardiac tamponade and responded in time to save her life. She went on to say that the difficulty with the condition of cardiac tamponade is that in its early phases the body compensates but this masks the evolving emergency until the point where the heart cannot pump adequately and there is sudden catastrophic collapse. She also noted that the medical response emergency team would not be called out for a situation where a child is talking and responding, (which was the case initially when the nurses were trying to obtain blood pressure and after Dr Bigby arrived.)

Other possible (and much more likely diagnoses) included intra abdominal bleeding, the onset of sepsis or septic shock from infection.

Dr McEniery's thoughts about the need for training for nurses who care for children with central line therapy were interesting. The difficulty with tamponade condition is that it is extremely rare. In Dr McEniery's experience in intensive care in the Royal Children's Hospital over a fourteen year period she had not seen this complication once. During that time she estimates she would have cared for over two thousand five hundred children with central lines- none have suffered the complication of cardiac tamponade that Jacinta developed.

To be effective teaching a nurse (or doctor for that matter) would have to have the opportunity to work in a cardiac intensive care unit. The only one operating in Brisbane is at the Prince Charles Hospital. Neither of the two children's hospitals in Brisbane have such a unit although the Mater Childrens Hospital has a paediatric cardiologist on staff. If a child ahs a cardiac problem the child is treated at the Prince Charles Hospital.

Dr McEniery's background experience was in working in children's' hospitals both in Sydney and Vancouver where cardiac units were established within the hospitals. Brisbane differs from other capital cities in Australia in this respect.

The existence of a specialist unit was, in Dr McAEniery's view, very significant for raising the specialist knowledge of the people actively working within the unit, but also of staff who rotate through and have contact with the unit. Without exposure to that experience, Dr McEniery thought it unlikely that a diagnosis of cardiac tamponade would be considered or diagnosed.

The discussion is a little removed from Jacinta's situation because Dr McEneiry pointed out that, even if the hospital had a cardiac paediatric unit it is unlikely that Jacinta would have been in any other ward that the surgical ward in which she was cared for.

The measures undertaken by the MERT (of administering a bolus of haemacel) could have exacerbated the condition if the additional fluid was delivered via the lumen into the pericardial sac due to a perforation. If not, then the additional fluid would have temporarily bolstered the heart in its attempts to continue pumping.

Dr Nicola Acworth is an anaesthetist who was in her fifth and final year of specialist training in 2002. Dr Acworth was one of the two anaesthetists involved in the operation performed on Jacinta on 24 September 2002. She was working with a senior anaesthetist, Dr Ian Webb, who was supervising. At the time, Dr Acworth estimates she would have previously inserted between ten and twenty central lines in children, (and many more in adults.) The central venous line was inserted at the request of the surgeon , Dr Kimble.

The central venous line is a catheter selected in accordance with Jacinta's age and weight (so that the appropriate length of tubing is obtained. A sample catheter was made available to the court to assist the understanding of the device. During the

insertion of the catheter Jacinta was monitored by an electro cardio graph. This has two purposes, first to monitor the electrical tracings of the heart and ensure that these remain within the " normal" range. Secondly, the electro cardio graph records an ectopic beat. This was explained as picking up the heart's beats which confirms that the catheter is being inserted and travelling in the direction of the heart. The presence of the catheter itself will alter the rhythm of the beating heart. Dr Acworth described picking up the ectopic beat as confirmation that the soft 'J' tip of the catheter is in the vessels travelling in the direction of the heart. The wire with the soft 'J'tip is inserted through the catheter and then the central venous line is threaded over the wire and the wire removed. Dr Acworth's evidence was that correct placement could include either in the superior vena cava or in the right atrium of the heart. Dr Acworth stated that it was not common practice to perform and read a chest x ray immediately on placement of the catheter intra-operatively. Instead it was the practice to aspirate a small amount of blood from each of the three lumens on the central venous line. Assuming there was a showing of blood, and no resistance as the tube was inserted, then the assumption could be made that the line was in a vessel. If this was not the case, then an x ray would be indicated. The catheter had three lumens, one on the tip (distal) and two others on the side within a very small distance. Dr Acworth thought that if the catheter had ended up in a position resting against a wall of the heart, that it would have been difficult to aspirate blood, but this had not been the case.

A chest x ray was taken at 9 39 the next morning on 25 September, (although Dr Acworth said she had not read the report.) She explained that as the patient was to go to intensive care after the operation, the follow up care is taken over by the intensivists. The x ray in fact confirmed that the tip of the right side of the central venous line was at the junction of the right atrium and the inferior vena cava, a position which Dr Acworth described as acceptable. She was aware that one of the purposes of the central venous line was for use to deliver parenteral fluid (for nutrition purposes.) This must be delivered in to a large vessel as it is irritative to tissue. The central line was used in the course of the operation to deliver fluids.

Dr Ackworth stated there was no other mechanism (other than aspiration or chest x ray) to check the opposition of the central venous line.

Dr Brin Jones, qualified in 1997 and is now studying paediatrics. At the time of Jacinta's admission he was an intensive care registrar at the Royal Children Hospital, working under the supervision of Dr McEniery.

He responded to the medical emergency call out for Jacinta at about 1.45 am on the morning of 26 September. He recorded his notes at about 3.00am. When he arrived on the ward, Dr Kym Robertson (the medical registrar) was already on the scene as well as Dr Bigby. Dr Robertson was already providing bag / mask ventilation to Jacinta and nurses were drawing up the intravenous fluids. He checked her pulse and could not find one. Her heart rate was low, at 60 beats per minute. Jacinta was making some gasping efforts at respiration but this ceased. Attempts to resuscitate her continued for around twenty five minutes. Dr McEniery was then contacted by phone. She offered to come in but confirmed that given the information of attempts to resuscitate for that period it was fruitless to continue. There was some discussion about what the cause of death might be and Dr Jones recorded the possible causes that he considered at the time. He thought the most likely was cardiac arrest due to low

blood volume (hypovolemia.) Jacinta had abdominal pain and thus consideration was given to fluid in the abdomen from bleeding.

Another possibility was arrhythmia secondary to the central venous line. This was explained as a rapid heart beat due to the positioning of the line causing irritation of the heart. However, this was less likely because Jacinta had a very low heart rate.

Electrolyte imbalance was considered a possible explanation given the total parenteral nutrition therapy subsequent to surgery. A blood test had been ordered to consider this more closely, and Dr Bigby had already taken blood when Dr Jones arrived.

It was also possible that Jacinta had suffered a large stroke (cerebral vascular accident, but again, this was thought to be unlikely because Jacinta had been alert and conscious until immediately before her sudden collapse.

Finally, sepsis was considered a possible precipitator of her collapse. Although her temperature immediately before collapse was back to normal (38 degrees) there had been a history of higher temperature. She had previously had an infection.

At the time of Jacinta's operation Dr Jones knew of the condition of cardiac tamponade. His evidence was that he was aware of the signs of tamponade which included low blood pressure, increased heart rate, swollen veins in the neck and muffled or soft heart sounds. He did not recall seeing any signs of swelling of veins n the neck. Cardiac tamponade simply did not occur to him at the time as one of the possible diagnoses.

His attendance was to a medical emergency when the child had collapsed and was unable to be resuscitated. He listened to the history as given to him by the nurses and doctors already in attendance, whilst actively physically assessing the child who was still in the course of being actively resuscitated. The assessment process he thought took some one to two minutes. By the time of his arrival there was no cardiac output and only gasping respirations, and then nothing. His major concern was the low blood volume. There was not the opportunity for careful perusal of the notes.

Dr Jones record of his attendance on Jacinta did include recording that Jacinta had cool peripheries, no palpable pulse, and un-recordable blood pressure. The heart sounds were heard and the beats per minute were recorded at 60. Her abdomen was distended and she was unresponsive to pain stimuli.

The signs of cardiac tamponade he said were non specific and could be consistent with other diagnoses. He thought, from all of the information available to him that the most likely diagnosis was abdominal bleeding or infection in the post surgery period.

He discussed the possibilities with Dr McEneiry after some twenty minutes of unsuccessful resuscitation.

Dr Ian Webb was the supervising anaesthetist at Jacinta's operation on 24 September . Dr Webb had qualified in 1993 and specifically in paediatric anaesthetics in 1994. He had inserted hundreds of central venous lines. He was monitoring Jacinta's condition while Dr Acworth was inserting the catheter. He confirmed that placement

of the catheter is designed to go into the right atrium of the heart chamber - any higher up, (into the superior vena cava) runs the risk of the line migrating out of the vessel. When putting the line in he said that you monitor for ectopic beats of the heart which confirms the line is into the right atrium. He said each catheter is chosen individually for its length depending on the patient's weight and age so that the tip ends up in the right atrium. The checking mechanism is by aspirating blood from each of the three lumens of the central line. Here, there was no problem with aspiration and therefore no problem was suspected.

The chest x ray was performed the next day on 25 September to check the position of the central venous line (which had already been used in the course of the operation to deliver fluids.) He did not check the x ray because the patient was going to intensive care where this would be done. He said selection of the right length of catheter was sufficient that the line will end up placed in the right spot. Chest x- rays would not normally be indicated before the lines are used in the course of surgery.
He agreed that cardiac tamponade is an acknowledged risk of central venous line access. He said that to reduce this risk, his method is to access via the right internal jugular vein (as was done here) to access directly a pathway to the right atrium of the heart. The soft tip of the wire also reduces the risk of perforation. Post operative chest x ray can check the position as well as monitoring venous pressure.

In Jacinta's case he said that the chest x ray revealed the cardiac silhouette to be normal (so at about 10.00am the next morning there was no sign of leaking into the pericardial sac.) However a microscopic tear would not be revealed by the chest x ray presenting a picture of a normal silhouette.

Dr Webb confirmed that parenteral fluid needs to be delivered in to a major vessel because it is very concentrated fluid. He would expect the procedure to be for a chest x ray to be used to check the position of the central venous line before administering the TPN fluid.

In relation to the positioning of the catheter he explained that the line is sutured into place at the neck, but there remains a degree of movement of the skin which meant there was some chance of migration. It was preferable not to withdraw the catheter to reposition it because of the need to re-suture and the risk of infection. There was also greater risk of migration in higher position.

Dr Roy Kimble, was the Paediatric surgeon who had taken over Jacinta's care while her usual treating specialist was on leave. He took over care from 22 September.
Dr Kimble saw Jacinta at 9.30pm on the evening of 23 September and earlier at 12. 30 pm that day. He saw her again at 9.30 am on the morning of 24 September, (the day before the operation.) She was suffering pain in her back, her abdomen was unchanged and she was afebrile, (as noted in the record by his registrar.) Contrast imaging was ordered and was done at about midday on 24 September. This showed a complete obstruction of the bowel (although Dr Kimble said that on surgery a slightly different picture was revealed.) There was an obstruction of the ileum (the last part of the small bowel just before the colon, (large bowel.) Dr Kimble described the operation as successful although difficult because of the previous surgery where layers of the bowel had been brought down to the bladder deliberately to revascularize it. This required dissection for the purposes of the operation. The surgery was long,

over a three hour period between 4.30 and 7.30 pm on 24 September and accordingly Jacinta was then taken to Intensive Care over night . Dr Kimble stated he saw Jacinta back on the ward late in the afternoon on 25 September with his Registrar. He described her as being "absolutely fine."

In relation to the issue of cardiac tamponade, Dr Kimble expressed the view that it was a well recognised, but incredibly rare complication of any central venous line. He had been involved with thousands of situations where central venous lines were inserted but never seen a cardiac tamponade complication. He thought that the vast majority of clinicians, including surgeons, would never have encountered a cardiac tamponade in association with a central line therapy.

He had expected that Jacinta would require the line to remain in place for between one and two weeks to assist her with recovery by delivering parenteral nutrition. He confirmed that Jacinta's medical history was very complex. Initially when he took over her care the diagnosis was not clear, (with some overlay between symptoms for both a urinary tract infection and a bowel obstruction. The situation was managed conservatively before the diagnosis was clarified and a decision for surgery was reached. The alternative option of a PIC line for access (via a fine line into peripheral veins) was less appropriate for Jacinta who could well require the three lumen accessibility provided by a central venous line. This would accommodate both her nutritional needs and also other drug and fluid if required.

Dr Guy Lampe qualified as a pathologist in 2001 and as a doctor in 1985. He performed the autopsy examination on Jacinta. His determination as that death was caused by;
1(a) cardiac tamponade, due to
1(b) total parenteral nutrition leakage into the pericardial sac associated with central venous line therapy.

The quantity of fluid that had "tensely distended" the pericardial sac was sufficient to have caused tamponade. On examination of the heart Dr Lampe found a small spot at the junction of the inferior vena cava and the right atrium. There was a similar spot on the exterior wall of the heart. On microscopic examination there were two small foci each measuring 5 millimetres close to the tricuspid valve. Each showed a central depression consistent in the size of the tip of a catheter, and one was immediately adjacent to the exterior spot. Neither could be "probed" to demonstrate a clear perforation of the heart wall. Dr Lampe explanted that microscopic examination showed that the in these areas the heart muscle had been affected. Total parenteral fluid is an agent that can cause destruction of tissue, and he concluded that each of theses areas of defect was caused when the tip of the catheter came into contact with the wall of the heart. He explained it as like an inflammatory response around the dimpled area where the heart muscle had died.

Testing for any bacterial organism (consistent with sepsis) was negative.

Dr Lampe's examination which revealed microscopic level damage to the heart wall as consistent with a slow development of the tamponade (as distinct from a scenario where a catheter had clearly punctured the wall of the heart where it would be expected that tamponade would develop within hours.) He confirmed other evidence

that this was still consistent with the Jacinta's' final sudden collapse. He, as well as other witnesses, said the condition was one where the body could compensate for a period of time by beating faster but would then suddenly be overwhelmed by the mounting pressure of the fluid which would restrict the heart's ability to pump, and sudden catastrophic collapse would ensue.

He confirmed his understanding of warning symptoms such as raised pulse rate, shortness of breath, distended jugular veins, and a build up of venous return pressure.

He looked for but did not find any clots in the central line (excluding the possibility of these moving on to cause emboli.)

Dr Lampe's most careful exploration could not demonstrate a definite hole through the wall of the heart, but the necrosis of the tissue in the particular areas on both the internal and external walls, together with the presence of fluid of similar analysis to TPN led him to conclude that leaching had occurred.

Dr Kieron Bigby, was an intern in the Department of Emergency Medicine at the Royal Children's at the time of Jacinta's admission. He completed his medical degree in 2001 and was fully registered in 2003. He worked a shift commencing from 11.30 pm on 25 September until 8.00am the next morning. He was able to be called throughout the hospital via a "beeper" which had been provided to him when he commenced work at the hospital some weeks before. At the end of a shift he would take the beeper home. He had not checked or changed the batteries in this time. He was unaware of any problem with the device. He turned it on at the beginning of the shift and assumed that it was functioning.

On any shift he could expect to receive anywhere between five and up to fifty calls. His evidence was that he could not recall any call prior to attending Jacinta at about 1.30am that morning. That call had come via the telephone system to him when he was in the emergency medicine department. Nurse Sey's evidence was that she spoke to Dr Bigby on the phone. Dr Bigby could remember a call, but not the name of the nurse. He recalled there was concern over the child's high pulse rate. But on questioning there was a need for some clarification as the information was that the pulse rate was variable. He could not recall having been informed that it was 154 beats per minute at 9.00pm, 156 at 10.00pm and 170 at 11.00pm. Nor could he recall being requested to come to review the child.

He said in retrospect he should have asked for more information and that might have prompted an attendance prior to the time when he was subsequently called to her bed.

When he attended on Jacinta he said she was showing signs of pain. There had been a decrease in urine output. Her blood pressure could not be measured and she was very pale. She had cold peripheries and a dry tongue and mouth. Her pulse rate was high at 160.

Dr Bigby's evaluation was that she had a low blood volume with the possibility of an internal bleed. It was the first time that he had seen the child but it was immediately evident that she had recent surgery. He acknowledged that he did not consider cardiac tamponade. (Dr Bigby's previous training had included a period of five weeks at the

Prince Charles Hospital, but he had not experienced a situation of cardiac tamponade.)

Within a very short time of his arrival on the ward Jacinta became unresponsive and a medical emergency was called. With the hindsight of information that Jacinta died due to cardia tamponade as a complication of central venous line therapy, Dr Bigby thought that he was not experienced enough to respond to Jacinta's condition. His supervisor, Dr Robertson, arrived on the scene in response to the medical emergency response team callout.

He confirmed that the call out system throughout the hospital system commenced with the most junior and inexperienced doctor before being referred if necessary higher up the hierarchy. It was only if a medial emergency was called that the first response would involve more senior and experienced doctors. However, of concern was that Dr Bigby said he was not clear about the circumstances in which a medical emergency should be called.

He was unaware of any changes to training of junior doctors in his position as a result of this death having occurred.

It was only later that he discovered there had been a problem with the pager after some general discussions around the hospital.

Professor Alan Isles, is a paediatrician and the District Manager of the Royal Children's Hospital and Health Service District, in charge of the Royal Children's Hospital.

Professor Isles explained that the pagers used in the Royal Children's Hospital are supplied by the Herston Campus of the hospital, (separate from the Royal Children's Hospital.) In the seven years during which he had been involved with the hospital he was unaware of any systemic problems with the use of pagers.
Professor Isles had no need to carry a pager himself but he expected that it would be custom and practice to turn it on at which time it should emit a sound and a light emitting diode screen that contains information, which would indicate that it was functioning. The pagers did not have a voltage indicator on them.

Pagers were the preferred method of contacting doctors throughout the hospital as the doctors were necessarily mobile. The use of mobile phones is incompatible with medical equipment.

The hospital undertook a full investigation concerning the pagers in use at the hospital as it was clear that nursing staff had attempted to contact the on call resident medical officer without acknowledgment,[1] and Dr Bigby had been unaware of these calls. An audit of the pager used by Dr Bigby revealed messages to call Surf ward on 26 September at ;
0.44.20,
0.51.23,
1.00.29 .

[1] Exhibit 26

A message to ring switch was sent at 1.06.05. At 1.11.00 switch was asked to divert calls to the pager number 42132 carried by Dr Bigby, to his MERT pager, number 42132.

Further investigation revealed that the pager used by Dr Bigby would emit a sound when turned on (indicating that it was "on") despite the fact that it would not function due to low voltage in the battery. Additionally, the particular pager had an automatic off functionality which was activated. The pager had been automatically turned off without Dr Bigby's knowledge and thus no messages would be received. (Dr Bigby had advised switch on 27 September that although the pager was turned on and indicated it was on, it did not appear to be working.)

In response to these problems the hospital has taken steps so that;

All medical emergency pagers were checked and the correct settings applied
-The supplier would only supply pagers with the auto- off functionality disabled
-A direction was issued to medical staff requiring that at the commencement of each shift the pager must be checked by desk top / switchboard or phone paging.
-A direction was issued not to alter electronic settings.
-A direction was issued that batteries in pagers must be changed every Monday
-There is now routine replacement of pagers upon expiration of warranty.
-All MERT pagers were replaced in November 2002 to "guardian" Pagers that have the auto –off functionality disabled by the manufacturer.

Professor Isles was asked to comment on the availability of specialist paediatric cardiac services in other children's hospital facilities in Australia and in other places throughout the world. His view was that there was no evidence to suggest that the absence of a cardiac unit as part of children's facility had any adverse impacts for patient safety. Professor Isles view was that there was a very safe cardiac service at Prince Charles Hospital that met all relevant benchmarks. As that service is physically remote from specialist children's facilities there are occasions when a child has to travel to that other facility. The alternative of siting a specialty cardiac service within the children's facility would leave that service isolated. The Professor pointed out that there are different views on the preferable option but that his understanding was that the evidence based review of the situation indicated the provision of specialist cardiac services for children within the existing specialist hospital (Prince Charles) was demonstrated to be providing good outcomes for patients. The alternative of a specialty situated within the children's facility would require a minimum of three specialists to be able to offer proper cover for on-call work in the interests of patient safety.

The other area explored with Professor Isles was whether the existing system of calling for the most junior doctor to attend a patient presenting as Jacinta did, is the best approach for patient care. Professor Isles response was that there is a mechanism that enables an urgent call for a more senior doctor, which is the MERT (medical emergency response team). He explained that a critically ill patient should be catered for within the MERT framework- the issue is whether or not there is recognition of the patient being in a critical state.

The difficulty is in distinguishing a patient who is "unstable," (to use Professor Isle's words) or a patient that is critical.

Professor Isles stated that there was no hierarchy "rule" as such that the intern (most junior doctor) should be called first. But the evidence here is that the nurses repeatedly called for that doctor via pager and only finally went to the telephone to contact the emergency medicine area when they were unable to contact the doctor and an hour had passed. Irrespective of this, Professor Isle's view was that perhaps a registrar also might not have been able to immediately diagnose cardiac tamponade , given its rarity.

Generally, Professor Isles preference (in the interests of patient outcomes) would be to have registrars in the Children's Hospital as the most junior medical staff, rather then interns still being trained. However, the reality is that the Children's Hospital is also a training institution for doctors who will go out to regional and country areas, and who need the exposure to paediatric care prior to such placements. The compromise reached is to place them in supervised positions (such as Emergency where more senior staff are working with them.)

Overall, Professor Isles preference would be for children to receive specialist care within a hospital designed specifically to address children's health issues, but in terms of the safest outcome for children with cardiac complaints his view was that this was being achieved by services delivered separately from the specialist hospital and clinicians.
He said that cardiac tamponade is such a rare and rapidly fatal condition that it could not be assumed that even in a specialist facility that staff of the requisite knowledge and seniority would be available at 1.30 am. Jacinta would still have been in a surgical ward (rather than a cardiac ward.)

Professor Isles said that follow up training in the intensive care are of the children's hospital had been undertaken.[2] He did not refer to any other follow up training, (which was consistent with nurses and the intern who all said they were unaware of any follow up training.)

Professor Isles indicated that it was likely that there would be a greater focus on potential complications that one might encounter in a cardiac patient if there was a cardiac ward at the children's hospital. (The potential may be open to infer that this greater awareness could flow through also to surgical wards where cardiac tamponade could be a complication of a central line therapy.) There remains the issue that even had Jacinta's condition been recognised, whether someone with sufficient experience skill and confidence to effectively treat the condition. The treatment would require the insertion of a very large bore catheter or needle into the space around the heart.
An ultra sound machine would ideally be used to guide such a procedure. Again, such staff is not rostered after hours but could be called in, in an emergency. To proceed without that back up would require considerable experience and skill beyond a doctor in training.

[2] page 208, line 51-52

The specific details of Jacinta's condition were put to Professor Isles, with some interesting results. He found it to be inconsistent that a patient could conscious and responding but without recordable blood pressure. With due regard to the Professor's experience and opinion, the weight of evidence was that neither the nurse attending to Jacinta, nor the senior nurse who checked could obtain a recordable blood pressure reading with more than one machine. Manual checking also could not record a blood pressure. Both nurses felt cool peripheries. It is quite clear that Jacinta was still talking to hospital staff including to Dr Bigby when he attended. His examination was consistent with the nursing observations- no blood pressure was able to be recorded, and peripheries were cool. There was an indication of increased effort on breathing with mild intercostal muscle recession. A radial pulse was able to be felt.

Whether the explanation of this inconsistency is a difficulty in detecting the blood pressure due to some skill or machine based reason, or whether Jacinta's case was highly unusual, is a moot point.

Dr Bruce Lister is Director of the Department of Paediatric Care at Mater Children's Hospital. He had not been involved with Jacinta's treatment and was called to review the medical record regarding Jacinta's treatment.[3] In summary, his comments did not criticise or differ with clinical decisions made in the Jacinta's treatment. There were risks of perforation of the heart if the central venous line was within the right atrium, but this was countered with the risk that if the tip was higher up, it could migrate.

Dr Lister considered he may have withdrawn the tip a fraction back into the atrium, but not to avoid the risk of perforation, but rather to avoid the risk of the tip migrating into the right ventricle and causing arrhythmia.

Dr Lister, who is a paediatric intensivist, had not encountered the complication of a child dying from cardiac tamponade. None of the witnesses at inquest had encountered this complication. He acknowledged that there were differing opinions about the optimum position of the tip of the catheter, but stated that in Australia the practice is for the tip to be within the right atrium. If the catheter was withdrawn it could increase the risk of fluid leaking into the thoracic space resulting in pleural effusion which could compromise breathing.

Dr Lister's view was that the skill level and possibility of more junior staff recognising or considering cardiac tamponade as a complication a central line, would have been increased if the treating hospital had a cardiac unit as part of the service. His reasoning was the overall increased number of central lines that would be in use and the greater awareness throughout the hospital of complications. He referred to the nursing staff who have this greater exposure to cardiac treatment as recognising the wave form generated by pressure in the right atrium, and be able to identify abnormalities.

Dr Lister was referring to the monitoring system in intensive care units where a child is monitored if a central venous line is in position. Where the children's hospital also includes cardiac surgery, his experience is that intensive care staff are familiar with interpreting the wave form monitoring of pressure from right atrium, and thus may

[3] Exhibit 15

have been able to identify an abnormality if the tip had moved while the child remained in intensive care.

Dr Lister differentiated the lower incidence of central lines in hospital where there was no cardiac surgery (suggested to be perhaps 20- 30%), from the higher incidence in children's hospitals where cardiac services are provide and nearly every child coming through intensive care will have a central line inserted.

Dr Lister also expressed the view that the volume of liquid detected at post mortem in the pericardium indicated that the leakage had been occurring for some time, (although it is noted that some of this fluid could have been there as a result of resuscitation attempts where fluids were administered via the central line.)

Dr Lister also thought that the existence of a cardia service on the same site would increase overall skill and awareness levels throughout the staff who may rotate through different units.

If a cardiac ultra sound had been performed early in the evening before she died, Dr Lister raised the possibility of the detection of the accumulation of fluid in the pericardium. His point was that the existence of cardiac services on site might lead to a lower threshold for the availability of ultra sound, and thus a greater likelihood of detection.

The possibility of a cardiologist registrar being able and available to perform such an ultra sound would have been higher.

Much of Dr Lister's comment was conjecture but given in the spirit of looking to wards any improvements that might improve care fro the child.

The issue of access to specialist training for caring for children in acute or critical care situations was also raised. Some might only be able to access these courses in their own time and at their own expense. Dr Lister's recommendation was that hospitals provide training to staff generally for paediatric life support training.

Dr Lister's comment son the responses on the particular night were that people at all levels had performed within the expected range of their skills and training.

Dr Lister's view of when Jacinta begun to deteriorate, (acknowledging the background situation that she had been unwell for some time) was from about 12.25am when nursing staff noted they couldn't feel her blood pressure and she had cool peripheries.

This had been preceded by a tachycardia episode around 18.45 on the evening of 25 September. With the knowledge of the outcome, Dr Lister could conclude that from that time pressure was building up in the pericardial space impeding the blood flow back to the heart.

But Dr Lister said it was only really from 12 .25 that a differential diagnosis of cardiac tamponade might be suspected- (weak pulse, un-recordable blood pressure and cool peripheries.)

The earlier tachycardia alone could not be sufficient to suspect developing tamponade.

At 12.25am he thought there were sufficient signs to warrant an ultra sound.

Dr Lister's view was that once cardia tamponade is identified the treatment needs to be implemented very quickly. A needle is inserted under the rib cage towards the heart and into the pericardial sac to relieve the pressure and withdraw the fluid.

He said that it is a procedure that "most of us have never performed." It is a very high risk procedure in itself- of causing arrhythmia, or perforation of the heart. It is a last response measure. Had there been an earlier diagnosis via echo cardiograph, then there was the possibility of a cardiologist or trainee who might use a soft catheter (to reduce the risks) to withdraw fluid.

Dr Lister, who had twenty eight years of medical practice, had not seen a child in a cardiac arrest situation with a cardiac tamponade.

After 12.25am he expressed the view that; "I would have hoped that diagnosis of cardia tamponade would have been considered as a possibility"

Dr Lister thought that the tip of the catheter must have been in the pericardial space at some time for fluid in such quantity to be detected there post mortem, (and not blood.) Dr Lister agreed with the pathologist that the perforation is not always identified.

I am satisfied on the balance of probability and find accordingly that:

(a) Jacinta died as a result of cardiac tamponade. This occurred in the context of a central venous line being inserted into her heart to administer total parenteral fluid for her nutritional needs after she had been very ill with a bowel obstruction requiring abdominal surgery. The morning after the surgery a chest x-ray confirmed the tip of the catheter was within the right atrium of the heart.

(b) The positioning of the catheter and the procedures used were all within the normal and acceptable practice of treatment in Australia.

(c) Although a frank perforation of the heart wall was not discovered at autopsy, the pathologist did find fluid within the pericardial sac which was chemically consistent with TPN fluid, possibly mixed with some other fluid. It is noted that in the process of the attempt to resuscitate Jacinta, that haemacel and saline were administered, which also could have entered the pericardial space.

(d) These treatments were appropriate in the circumstances and the administration of fluid may have temporarily bolstered the heart in its attempts to function, but did not address the unidentified condition of tamponade.

(e) At the time of Jacinta's collapse a possible diagnosis of cardiac tamponade was not considered to be the cause of her condition by any of the treating team. The

evidence, and Jacinta's history, was that alternative diagnoses were more likely, (notably low blood volume due to internal bleeding post surgery.)

(f) Cardiac tamponade is an extremely rare but known complication of the placement of central venous lines. The indicators for cardiac tamponade are non specific and could also indicate a number of other conditions.

(g) There were signs that could have been interpreted as indicating the development of cardiac tamponade in the hours leading up to Jacinta's death, particularly from about twenty five minutes after midnight when the attending nurse could not find a blood pressure reading. Checks were made using different machines and also manually by other nurses with a similar lack of reading. Other signs that were present included the radial pulse being very faint and cool peripheries as well as a pale appearance.

(h) Some other circumstances made it more difficult for staff to have suspected tamponade (or indeed that Jacinta was in a critical, not just unstable condition.) These included that Jacinta remained capable of mobility and able to communicate with staff until after the arrival of the resident intern at 1.30am.

(i) There was a problem with communication between the ward and the on call doctor. This was due to a combination of factors related to the pager. The battery was low but there was no indicator to the operator that this was the case. The auto – off function, which was also unknown to the operator, was activated, thus disabling the pager. These factors caused delay in the communication between the ward and a doctor and in the response of a doctor in attending the ward. However, it did not impact on the fact that the nursing staff were still able to call a medical emergency response team, (or to contact switch to divert calls from one pager to another, which they did.) The conflicting signs from Jacinta's condition were such that the nurses did not call a medical emergency. The hospital has addressed the pager communication issues.

(j) The indicators of imminent collapse and critical illness were deceptive and contradictory in Jacinta's case. There had been an extended period of time (in excess of an hour) when nurses and then the intern had been unable to obtain a blood pressure reading. Jacinta's heart rate had been variable but increasing over a number of hours, but her oxygen saturation levels and continuing conscious state and ability to respond to questions and to move about were a contra indication of her being in a critical state. An understanding of this was offered by the pathologist amongst others who explained the body's extraordinary ability to compensate until the point of imminent collapse.

(k) The condition of cardiac tamponade is life threatening and requires urgent treatment. This is undertaken via a large bore needle or soft catheter being inserted up under the rib cage through the membrane of the pericardium into the pericardial space. Fluid is drained to reduce the pressure on the heart to enable a resumption of pumping. The procedure is a high risk one with the possibility of disruption of the heart's attempts to pump and of rupture of the heart itself. None of the doctors attending on Jacinta on the evening of her death had relevant experience, or training to attempt the procedure.

(l) A life extinct Certificate was issued in respect of the deceased by the intensive care registrar at the Royal Children's Hospital. It certified that at 4.00am on 26 September 2002 life was extinct.

(m) Post mortem examination was performed upon the body of the deceased on 27 September 2002 by Dr Guy Lampe. He expressed the opinion that the medical cause of death was cardiac tamponade due to total parenteral nutrition fluid leakage into the pericardial sac as a result of central line therapy. Spina bifida (surgically treated) also contributed to the cause of death.

I make the following formal findings –

(a) The identity of the deceased was Jacinta Kate Robinson.

(b) Her date of birth was 16 March 1995.

(c) Her last known address was 44 Kanturk Street Ferny Grove Qld 4055.

(d) At the time of death her occupation was student.

(e) The date of death was 26 September 2002.

(f) The place of death was Royal Children's Hospital Brisbane

(g) The formal cause of death was cardiac tamponade, due to total parenteral nutrition fluid leakage into pericardial sac as a result of central line therapy. Spina bifida (surgically treated) also contributed to the cause of death.

This Court has jurisdiction in appropriate cases to commit for trial any person/s which the evidence shows may be charged with the offences mentioned in section 24 of the Act. There is no evidence sufficient to put any person or persons upon any trial. No person will be committed for trial.

RECOMMENDATIONS:

Pursuant to section 43 of the Act, the following recommendations are made by way of rider to the formal findings.

I recommend:

1 There be a review of training in the Royal Children's Hospital for nurses and general medical staff (as well as intensivists) to raise the awareness of the possible complications of central venous line therapy which include cardiac tamponade.

2 That consideration is given by the hospital and / or Queensland Health to enable nurses and junior medical staff to be funded to attend acute or critical care specialist training courses.

I do not propose to go into the debate over the relative merit of establishing a cardiac unit at the Royal Children's Hospital, or elsewhere. This is beyond the scope of an inquest. Suffice to say that the circumstances of Jacinta's death, rare as the condition was, did raise these issues. The role of a coroner in my view is to flag these issues and refer them to Queensland Health for proper consideration and ongoing review and debate to ensure that service delivery to children is the primary determinant of where and how services should be delivered. The strongly divergent views evident in this inquest has the potential to deflect effort into winning the argument, but perhaps losing opportunities to come up with some innovative ways to respond to the challenges. Accordingly I recommend that;

3 Queensland Health continue consideration of the best approach to delivery of specialist, particularly cardiac services to children in Queensland, particularly having regard to the circumstances of this death.

Copies of the recommendations including a summary of the evidence are to be forwarded to Queensland Health, the Minister and Director General and the Royal Children's Hospital.

Finally I acknowledge the personal tragedy of Jacinta's death and the great loss to her family. Jacinta faced many medical problems but this inquest has heard that she was a brave and bright little girl getting on with her life and actively involved at school in spite of her difficulties. Please accept our sympathy to the family and her friends in their loss.

I thank all who have assisted in this inquest and hope that the process has helped to bring a greater understanding of the circumstances leading up to Jacinta's death and a greater awareness of the condition of cardiac tamponade in these circumstances.
The inquest is now closed.

Chris Clements

Deputy State Coroner
4 May 2005