



**CORONERS COURT  
OF NEW SOUTH WALES**

**Inquest:** Inquest into the death of Emiliana Obusan

**Hearing dates:** 1 to 3 November 2021

**Date of findings:** 19 November 2021

**Place of findings:** Coroner's Court of New South Wales at Lidcombe

**Findings of:** Magistrate Derek Lee, Deputy State Coroner

**Catchwords:** CORONIAL LAW – cause and manner of death, endotracheal tube, unrecognised oesophageal intubation, tracheal intubation, provision of anaesthesia care to paediatric patients, qualifications and experience of paediatric anaesthetists, end tidal carbon dioxide, capnography, Port Macquarie Base Hospital

**File number:** 2019/00038771

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**Findings:**

Emiliana Belle Obusan died on 4 February 2019 at Port Macquarie Base Hospital, Port Macquarie NSW 2444. The cause of Emiliana's death was unrecognised oesophageal intubation. The unrecognised oesophageal intubation occurred during anaesthesia care provided to Emiliana in preparation for surgery to treat a bite wound to her right middle finger. This wound occurred when Emiliana was accidentally bitten by a black cockatoo whilst visiting an animal wildlife park. The oesophageal intubation resulted in sudden deterioration of Emiliana's condition. Despite a number of indications being apparent as to the reversible cause of Emiliana's deterioration, these indications were not recognised and, consequently, appropriate therapies to preserve Emiliana's life were not instituted.

**Non-publication order:**

Pursuant to s 74(1)(b) of the *Coroners Act 2009* the publication of Exhibit 2, titled 'Photograph: 137 View of medical tube on Trolley D in the Large Operating Theatre at Port Macquarie Hospital' is prohibited.

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## 1. Introduction

- 1.1 On 4 February 2019 Mary and Apollo Obusan took their 19-month old daughter, Bella, to a wildlife park in Port Macquarie. The family had spent a wonderful weekend away and planned to visit the park before driving home to Sydney. Whilst at the park Bella was bitten on the right middle finger by a black cockatoo after she placed her hand inside a bird enclosure.
- 1.2 Bella's parents took her to nearby Port Macquarie Base Hospital so that the bite wound to her finger could be assessed and treated. It was decided that surgery was required and that Bella needed general anaesthesia. During this process, Bella's heart rate and oxygen saturations decreased to precariously low levels and she went into cardiac arrest. Despite resuscitation efforts Bella could not be revived and was tragically pronounced deceased, only 10 hours after arriving at the wildlife park.

## 2. Why was an inquest held?

- 2.1 Under the *Coroners Act 2009* (**the Act**) a Coroner has the responsibility to investigate all reportable deaths. This investigation is conducted primarily so that a Coroner can answer questions that they are required to answer pursuant to the Act, namely: the identity of the person who died, when and where they died, and the cause and the manner of that person's death.
- 2.2 Certain deaths are reportable to a Coroner. Some examples of reportable deaths are where the cause of a person's death is not due to natural causes, or where the cause or manner of person's death may not immediately be known. In Bella's case, although a postmortem examination was performed, the cause of her death could initially not be ascertained. Further, the deterioration in Bella's condition raised questions regarding the process of anaesthesia and, in particular, whether some aspect of Bella's intubation during this process contributed to her death. Additionally, the circumstances surrounding Bella's death raised broader questions regarding the provision of anaesthetic care in a regional hospital setting to patients of Bella's age. For all of these reasons, an inquest was required to be held.
- 2.3 In this context it should be recognised at the outset that the operation of the Act, and the coronial process in general, represents an intrusion by the State into what is usually one of the most traumatic events in the lives of family members who have lost a loved one. At such times, it is reasonably expected that families will want to grieve and attempt to cope with their enormous loss in private. That grieving and loss does not diminish significantly over time. Therefore, it should be acknowledged that the coronial process and an inquest by their very nature unfortunately compels a family to re-live distressing memories several years after the trauma experienced as a result of a death, and to do so in a public forum. This is an entirely uncommon, and usually foreign, experience for families who have lost a loved one.
- 2.4 It should also be recognised that for deaths which result in an inquest being held, the coronial process is often a lengthy one. The impact that such a process has on family members who have

many unanswered questions regarding the circumstances in which a loved one has died cannot be overstated.

- 2.5 Inquests have a forward-thinking, preventative focus. At the end of many inquests Coroners often exercise a power, provided for by section 82 of the Act, to make recommendations. These recommendations are made to organisations and individuals in order to draw attention to systemic issues that are identified during a coronial investigation, and examined during the course of an inquest. Recommendations in relation to any matter connected with a person's death may be made if a Coroner considers them to be necessary or desirable. Where an inquest is able to identify issues that may potentially adversely impact upon the safety and well-being of the wider community, recommendations are made in the hope that, if implemented after careful consideration, they will reduce the likelihood of other adverse or life-threatening outcomes.

### **3. Recognition of Bella's life**

- 3.1 Inquests and the coronial process are as much about life as they are about death. A coronial system exists because we, as a community, recognise the fragility of human life and value enormously the preciousness of it. Recognising the impact that a death of a person has, and continues to have, on the family and loved ones of that person can only serve to strengthen the resolve we share as a community to strive to reduce the risk of preventable deaths in the future.
- 3.2 Understanding the impact that the death of a person has had on their family only comes from knowing something of that person's life and how the loss of that life has affected those who loved that person the most. Therefore it is extremely important to recognise and acknowledge Bella's life in a brief, but hopefully meaningful, way.
- 3.3 Emiliana Belle Obusan, or Bella as her parents lovingly called her, was born on 4 July 2017 following a long labour. After her birth, and upon hearing Bella's first cry, Apollo describes his and Mary's hearts melting. When he held his daughter for the first time, Apollo fondly recalls being immediately overwhelmed by his love for Bella. It is evident that the enormous love that Apollo and Mary have for Bella since that moment has not diminished in any way, but makes their physical separation from her unbearably painful.
- 3.4 Bella was a very good baby: easy to take care of, a good sleeper and rarely cried unless she was hungry. As she grew older, Bella's parents noticed how sociable she was, always greeting people with a smile and a giggle. Apollo describes Bella having big round eyes that lit up every time she smiled. Indeed, Apollo says that every time he saw Bella smile all his stress and worries would dissipate. Similarly, Mary fondly recalls coming home from work and being greeted at the door by Bella who would have the sweetest of smiles for her mother. It is no wonder that when her parents would take Bella out, they were frequently stopped by complete strangers who remarked what a beautiful baby Bella was. Apollo describes Bella as his and Mary's sunshine and, even for those who did not have the pleasure of knowing Bella, it is easy to see why.
- 3.5 Following Bella's birth, Mary decided to stop working for a year in order to be a full-time mother to Bella. During this period Mary was completely devoted to Bella, who was constantly at the forefront of Mary's thoughts and actions. Indeed, there was never a night when Apollo and Mary

went to bed without Bella being beside them. Apollo describes this period as the best time of their lives, with the young family enjoying the simple pleasure of each other's company.

- 3.6 Bella enjoyed playing hide and seek with her parents and loved going to her local park near the family home in Berala. Apollo and Mary have loving memories of going to the beach together, taking Bella to birthday parties for her friends and enjoying a family holiday to the Philippines. Whilst Bella and her parents forged many treasured memories and experiences in an all too brief 19 months of life, it is distressingly painful to know of the many memories and experiences that Bella and her parents will now never have.
- 3.7 However, there can be no doubt that Bella remains very much a part of the lives of Mary and Apollo, and of her younger brother, Isaac. The memories that the Obusan family have of Bella, her beautiful smile, her playfulness, her outgoing nature and her boundless love for her family will continue to endure.

#### **4. Bella's medical history<sup>1</sup>**

- 4.1 Bella was born naturally at 39 weeks, two days gestation at Auburn hospital on 4 July 2017. The pregnancy and delivery were both uncomplicated. Bella was a happy and healthy baby, and met all her developmental milestones. Notably, Bella began walking independently at 15 months, her immunisations were up-to-date and she had no major illnesses.
- 4.2 Upon commencing solids, Bella was known to be somewhat of a fussy eater. Following review by a paediatrician, it was recommended that Bella be commenced on an infant formula. Following some blood tests in September 2018, another paediatrician recommended an iron supplement, which was commenced in December 2018.
- 4.3 Despite the above, Bella remained small and light for her age. Although there is some discrepancy in the hospital records regarding her weight, at autopsy Bella was reported as weighing 9.4 kg (which is below the 25th percentile for her age) and 77 cm tall (which is at the 10th percentile for her age).

#### **5. Background to the events at Port Macquarie Base Hospital**

- 5.1 On Saturday, 2 February 2019 Bella and her parents took a trip from their home in Sydney to Port Macquarie. Mary was six months pregnant at the time and the trip was meant to be a "babymoon" of sorts. Over the weekend, the Obusan family stayed in a hotel and spent some time sightseeing around the Port Macquarie area. Bella had a wonderful time, having fun in the hotel swimming pool, enjoying the music from a band playing in the background, and taking a sunset walk with her parents along the Hastings River in the evenings.
- 5.2 On Monday, 4 February 2019 the Obusan family prepared to return home to Sydney. Bella had some formula at breakfast, and the family checked out of their hotel. Following this, the family visited Tacking Point Lighthouse, and then decided to visit the Billabong Zoo, Koala & Wildlife Park

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<sup>1</sup> This factual background has been drawn from the helpful opening submissions of Counsel Assisting.

(Billabong Zoo) arriving at around 9:00am. During the morning, Bella and her parents spent some time looking at the animals.

- 5.3 At around 10:30am, Bella and her parents took a break and had a picnic. Bella ate some food, including watermelon, some corn and a Milo snack pouch.
- 5.4 At around 11:30am, Bella and her parents were near some bird enclosures. Bella approached an enclosure, which contained a black cockatoo on the ground, and placed her right hand against the wire mesh surrounding the enclosure. The cockatoo approached and bit the top of Bella's right middle finger.
- 5.5 Mary quickly pulled Bella's hand back and saw that there was a lot of blood from the bite wound. Bella was understandably very upset, and her parents took her to a nearby cafe. A Billabong Zoo staff member obtained some band aids and tried to provide first aid, whilst another staff member obtained some ice. It was noted that the bite wound appeared to be deep and was bleeding profusely.
- 5.6 Apollo did a quick internet search and found that Port Macquarie Base Hospital (PMBH) was located only six minutes' drive away. As they were understandably concerned about the bite wound, Bella's parents decided to drive to PMBH. Bella was still upset when being put into the car, and she also vomited, before subsequently falling asleep.

## 6. Events at Port Macquarie Base Hospital

- 6.1 Bella and her parents arrived at PMBH at around 12:02pm. Bella was triaged and it was noted that the tip of her middle finger was almost amputated, with a small laceration on top, and that the bleeding had stemmed by this stage. Bella was still sleeping at this time and noted to be settled.
- 6.2 Bella was subsequently reviewed by a junior medical officer in the emergency department. As the bite wound was noted to be deep, a plan was formulated for an orthopaedic consult, intravenous antibiotics (piperacillin, tazobactam) and an x-ray to be performed. The latter was done about an hour later and showed no bony injury.
- 6.3 At around 1:30pm a cannula was inserted into Bella's left hand and intravenous antibiotic therapy was commenced. Bella was also given some analgesia.
- 6.4 At Around 4:00pm Bella was reviewed by the orthopaedic registrar, Dr Yasith Edirisinghe, who examined the bite wound, describing it as a "*deep de-gloving laceration to the right middle finger going deep into the pulp*", with a further minor laceration to the right index finger. Concerns were expressed about possible exposure of the bone, but this was unable to be confirmed.
- 6.5 At around 4:30pm Dr Edirisinghe discussed Bella's case with the orthopaedic surgeon, who recommended surgery, namely debridement<sup>2</sup>, washout and exploration, and repair of any damage structures under magnification. As the surgery was considered to be relatively straightforward, the plan was for Dr Edirisinghe to perform it.

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<sup>2</sup> The removal of dead or infected skin tissues to help a wound heal.

- 6.6 Dr Edirisinghe explained the proposed surgery to Mary and Apollo, who subsequently signed a consent form. Arrangements were then made to book the surgery. In preparation for surgery Dr Edirisinghe discussed the matter with Dr Daniel Zeloof, an anaesthetic registrar. Dr Zeloof subsequently went to the emergency department to assess Bella. A detailed medical history was obtained, including Bella's developmental milestones, lack of medical conditions and confirmation that she had no known allergies or any family history of issues with anaesthetic. Dr Zeloof noted that Bella was underweight for her age, but otherwise healthy and well. It was also noted that Bella had no respiratory infections in the preceding six weeks, although she had a runny nose with clear secretions that morning. Upon examination, Dr Zeloof found that Bella's airways and chest were clear. Dr Zeloof subsequently completed a pre-anaesthetic assessment form.
- 6.7 Dr Zeloof explained to Bella's parents the plan to perform surgery and to use a general anaesthetic. He also explained the common risks of anaesthesia, such as pain from the surgery, nausea, vomiting, delirium and a sore throat. According to Mary, Dr Zeloof also advised that PMBH was not a paediatric hospital, and that he normally would administer general anaesthetic to children over 10kg in weight. As a result, Dr Zeloof indicated that he would have to check any relevant policy at PMBH.
- 6.8 Following this, Dr Zeloof went to the operating theatre to discuss the plan with the on-call anaesthetic consultant, Dr Mitchell Lawrence. Dr Zeloof provided Bella's history to Dr Lawrence who proposed a rapid sequence induction (**RSI**) form of anaesthesia. This involved using agents to induce anaesthesia and placing an endotracheal tube (**ETT**) in the trachea to support breathing. RSI is typically used where a patient is at risk of pulmonary aspiration.<sup>3</sup> In Bella's case, Dr Lawrence was concerned about the time since Bella had last eaten, at around 10:30am, and the risk that she might vomit. Dr Lawrence and Dr Zeloof also agreed that a muscle relaxant would not be used, due to the surgery being a relatively short procedure and the risks associated with the use of such drugs.
- 6.9 The anaesthetic team comprised Dr Lawrence, who was to manage the administration of medication, Dr Zeloof, who would manage Bella's airway, and an anaesthetic nurse, Registered Nurse (**RN**) Kaylee Beauchamp. Preparations were made for surgery which included the following:
- (a) Selection of two ETTs, a size 4 and a size 4.5. Both ET tubes were cuffed, meaning that they had a balloon near the end which can be inflated to prevent air leaking.
  - (b) Obtaining a laryngeal mask airway (**LMA**) in case there was difficulty placing the ETT.
  - (c) Obtaining a paediatric breathing circuit<sup>4</sup>, called a Mapleson F.
  - (d) Medication doses were calculated and obtained, and written on a whiteboard in the operating theatre (**OT**).

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<sup>3</sup> Whilst under anaesthesia, stomach contents may enter the trachea and lungs, causing a variety of consequences ranging from no injury to pneumonia, or even death from asphyxiation.

<sup>4</sup> A commonly used anaesthetic breathing system consisting of pieces of plastic tubing and a bag that connects oxygen and other medical gases to a patient's airway, whilst carrying exhaled carbon dioxide away from the patient.



- 6.10 As part of preparation, Dr Lawrence discussed Bella's case with Dr Vyacheslav Seppi, a consultant anaesthetist and visiting medical officer (**VMO**). Dr Lawrence explained the proposed surgery and provided Dr Seppi with some information about Bella, including her age and that she was somewhat small for her age. Dr Lawrence also asked Dr Seppi to remain at the hospital until after induction of anaesthesia. Dr Seppi agreed and enquired whether Dr Lawrence also wanted him to be present in the OT during the induction. Dr Lawrence indicated that this was not necessary.
- 6.11 At around 5:10pm Bella was escorted to the OT, and she was noted to be distressed. Dr Lawrence discussed the procedure again with Mary, explaining the common risks of anaesthesia. Some further checks of the equipment were also conducted.
- 6.12 At around 5:25pm RN Beauchamp completed a pre-procedure checklist, noting that Bella had no allergies. A short time later, at around 5:39pm, Mary carried Bella into OT 1 for anaesthesia to be commenced.
- 6.13 Bella was placed on the OT table and Dr Zeloof held a gas facemask onto Bella's face. This caused Bella some distress and she was wriggling at the time. As this was occurring, Dr Lawrence observed that the end-tidal carbon dioxide<sup>5</sup> (**ETCO<sub>2</sub>**) monitoring, which monitored expelled carbon dioxide, did not appear to be working.<sup>6</sup> The sample line was found to be slightly loose, and so Dr Zeloof tightened it. The monitor then displayed some ETCO<sub>2</sub> waveforms of over 80.
- 6.14 Dr Lawrence provided confirmation to proceed and administered fentanyl, followed by propofol, through a cannula. RN Beauchamp commenced sevoflurane to maintain anaesthesia. At this point, at around 5:41pm, Mary was escorted out of the OT. She subsequently called Apollo to advise that Bella had gone into the OT.
- 6.15 Meanwhile, Bella was observed to be apnoeic. Dr Zeloof used a gas mask to test her ventilation and Bella was observed to cough. Dr Lawrence increased the administration of propofol, resulting in an improvement in ventilation.
- 6.16 Dr Zeloof then commenced to insert a size 4 ETT. He placed a laryngoscope<sup>7</sup> into Bella's mouth to expose her glottis<sup>8</sup>, the opening of her airway. Dr Zeloof initially did not have a good view of the glottis but this was able to be improved with manipulation. Following this, Dr Zeloof inserted the ETT to a depth of about 15 centimetres and it was connected to the paediatric breathing circuit.
- 6.17 RN Beauchamp introduced air into the ETT cuff. This produced an audible air leak, causing RN Beauchamp to introduce more air. However the air leak remained, which was heard by both Dr Zeloof and Dr Lawrence. They each also observed that Bella's chest appeared to be inflating on both sides, that the ETT was misting or fogging, and that there was an ETCO<sub>2</sub> trace, although the waveforms were noted to be small. It was also noted that Bella's oxygen saturations were below 90%.

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<sup>5</sup>The level of carbon dioxide that is released at the end of an exhaled breath.

<sup>6</sup> ETCO<sub>2</sub> monitoring is represented as a number (called capnometry) and a graph (called a waveform) on a monitor. The waveform shows how much CO<sub>2</sub> is present at each phase of the respiratory cycle. ETCO<sub>2</sub> monitoring, or capnography, provides instantaneous information about ventilation, which is the movement of air in and out of the lungs.

<sup>7</sup> A small instrument used to visually inspect the throat and larynx.

<sup>8</sup> The valve-like opening between the vocal folds in the larynx that controls airflow in and out of the respiratory passages.

- 6.18 Due to the low saturations, Dr Lawrence took over management of Bella's airway from Dr Zeloof, and requested that Dr Seppi attend. Dr Lawrence then withdrew the ETT slightly. Dr Zeloof auscultated Bella's chest and was able to hear bilateral air entry, but also harsh or coarse wheezing sounds which he thought were from the upper airway.
- 6.19 Dr Seppi arrived in the OT at around 5:45pm. Dr Lawrence discussed the situation with Dr Seppi and a decision was made to replace the ETT. Dr Lawrence removed the first ETT and RN Beauchamp noticed that the ETT had some blood near the cuff and tip. Dr Lawrence took a size 4.5 ETT and placed it into Bella's glottis under direct vision using a laryngoscope. Initially, Dr Lawrence was able to obtain a Grade 2B<sup>9</sup> view, but with manipulation he was subsequently able to obtain an improved Grade 2A view<sup>10</sup>. The ETT was inserted to a depth of 12 centimetres and Dr Lawrence states that he saw the ETT pass between the vocal cords. Once in place, the ETT was not secured with tape, in accordance with usual practice.
- 6.20 RN Beauchamp again slowly introduced air into the ETT. This again resulted in an audible air leak, although it appeared to be less than before. Each of the doctors auscultated Bella's chest, and heard bilateral chest sounds and a harsh wheeze. It was also noted that Bella's oxygen saturations were falling (to about 80 to 85%) but that it appeared she was getting some oxygenation.
- 6.21 At some stage, Bella's stomach was noted to be distended. Dr Seppi asked for a suction catheter and later used this to remove air from the stomach. According to Dr Seppi, he asked, "*Is it in?*", referring to the ETT, and reportedly received confirmation from both Dr Lawrence and Dr Zeloof that it was. Dr Seppi removed a blanket and a rolled towel, that had been placed under Bella's shoulders and head, respectively. Dr Seppi also noted that the breathing circuit was at high pressure, and took steps to reduce this, and that minimal ETCO<sub>2</sub> waveforms were displayed on the monitor.
- 6.22 At around 6:00pm, a fourth anaesthetist, Dr Eva Barton, was asked to attend the OT. Dr Barton arrived within minutes and auscultated Bella's chest, hearing the same coarse chest sounds and wheeze. Dr Barton also noted the audible air leak and that Bella's stomach was distended. An anaesthetic technician was called to check the cuff pressure. It was found to be high and was reduced.
- 6.23 Dr Lawrence suggested that Bella may have bronchospasm (a constriction of the bronchi or airway as it enters the lungs) and anaphylaxis (an allergic reaction). The team considered that anaphylaxis could not be ruled out and began to treat Bella accordingly. Salbutamol was obtained and Dr Seppi introduced this into the breathing circuit. Dr Barton proposed deepening the anaesthetic to improve ventilation, and also using a muscle relaxant. As a result, both fentanyl and suxamethonium were administered.

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<sup>9</sup> A grading under the Cormack-Lehane classification system that classifies views obtained by direct laryngoscopy based on the anatomical structures able to be seen. A Grade 2B view indicates only the posterior portion of the glottis or arytenoid cartilages (a pair of cartilages at the back of the larynx) can be seen.

<sup>10</sup> A partial view of the glottis.

- 6.24 A short time later, at around 6:05pm, Bella’s oxygen saturations fell dramatically. Her heart rate dropped and atropine was administered, without any response. When Bella’s heart rate dropped to 60 beats per minutes, Dr Zeloof declared a cardiac arrest.
- 6.25 Cardiopulmonary resuscitation was initiated and continued for over 40 minutes. A number of other staff members attended the OT including Dr Kandasamy, a paediatrician. He noted that Bella’s pupils were fixed and dilated. A number of drugs were administered to Bella, including adrenaline. There was a brief return of spontaneous circulation, followed by asystole with resuscitation efforts recommenced. An ultrasound was performed in order to rule out a pneumothorax (collapsed lung), and blood gas results were also obtained. An anaphylaxis kit was also obtained and followed. At some stage, Dr Seppi suggested that Bella could have a trachea-oesophageal fistula.
- 6.26 At 6:31pm Dr Kandasamy contacted the Newborn and Paediatric Emergency Transport Service (NETS) and discussed Bella’s case with a retrieval consultant and paediatric intensivists at the Sydney Children’s Hospital. During the call, the NETS retrieval consultant asked, “*Now what size is the tube [...] the airway, is it definitely in the right place? Have they checked it with a Pedi-Cap?*”<sup>11</sup>
- 6.27 At around 6:50pm, following more than 40 minutes of cardiopulmonary resuscitation, it was determined that all available options had been undertaken. The resuscitation efforts were ceased and Bella was tragically declared deceased at 6:52pm.

## 7. The postmortem examination

- 7.1 Bella was later taken to the Department of Forensic Medicine in Sydney. Upon admission, as part of routine procedure, a postmortem computed tomography (CT) scan was performed on 6 February 2019, which was later reported on by Dr James Raleigh, radiologist. In his report dated 13 December 2019, Dr Raleigh noted:

The endotracheal tube lies in the oesophagus, with its balloon inflated. The tip of the ETT lies at the T3 level.

- 7.2 On 7 February 2019, an autopsy was performed by Dr Issabella Brouwer, forensic pathologist. Bella was noted to weigh 9.4 kilograms and to be 77 centimetres in height, with her weight and height below the 25th and 10th percentile for age, respectively. Relevantly, the autopsy identified the following significant findings:
- (a) A 10mm incised wound present on the distal phalanx of the right middle finger, extending through the pulp of the finger and involving the entire length of the distal phalanx.
  - (b) A smaller incised wound present on the posterior aspect of the right middle finger on the middle phalanx.
  - (c) A superficial linear tear, measuring 10 mm in length, present in the mucosa of the oesophagus, just above the lung hilar area, and not extending through the full thickness of the oesophagus.

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<sup>11</sup> A small, single patient use, CO2 detector that changes colour to assist in verifying correct ETT placement.

Areas of haemorrhage (with the largest area being approximately 5mm x 5mm) were also present in the upper third of the oesophagus and pharynx.

- (d) Focal areas of atelectasis/collapse in the lungs, with no other focal lesions noted.
- (e) Mast cell tryptase level was noted to be within normal reference range values, thereby excluding anaphylaxis as a cause of death.

7.3 In the autopsy report dated 20 February 2020, Dr Brouwer noted that the postmortem examination identified no pre-existing natural pathology that may have contributed to the death. Further, Dr Brouwer concluded that the direct cause of death and any significant contributing factors cannot be determined, and that “[t]he cause of death is therefore best left as unascertained”. Dr Brouwer noted that further independent clinical review by an anaesthetist and/or clinical pharmacologist is advised.

## 8. What issues did the inquest examine?

8.1 Prior to the commencement of the inquest a list of issues was circulated amongst the sufficiently interested parties, identifying the scope of the inquest and the issues to be considered. That list identified the following issues:

- (1) How the injury to Bella’s finger occurred.
- (2) Whether appropriate action was taken, following Emiliana’s presentation at Port Macquarie Base Hospital on 4 February 2019, regarding the following matters:
  - (a) the assessment of Bella’s injury;
  - (b) the decision to undertake washout and suture repair;
  - (c) the decision to perform the procedure under general anaesthesia, including the adequacy of any guidance provided (then, and currently) regarding such a decision; and
  - (d) the method of anaesthesia.
- (3) Whether oesophageal intubation occurred, and if so, how, and when it occurred.
- (4) Whether appropriate and adequate action was taken in response to Emiliana’s condition during surgery, in particular considering the following aspects of her presentation:
  - (a) the observations of Dr Zeloof and Dr Lawrence regarding tube placement;
  - (b) harsh or coarse bilateral breathing sounds, rising chest and misting of the endotracheal tube;
  - (c) low end tidal CO<sub>2</sub> readings;

(d) a decrease in oxygen saturation; and

(e) possible explanations for Bella's condition, including bronchospasm and/or anaphylaxis.

(5) The cause of Bella's death.

(6) Whether it is necessary or desirable to make any recommendations in relation to any matter connected with the death.

8.2 Each of the above issues is discussed in detail below. In order to assist with consideration of some of these issues, opinion was sought from the following experts as part of the coronial investigation. Each of the experts provided reports which were included in the brief of evidence, and each expert also gave evidence during the inquest:

(a) Professor Andrew Davidson, a consultant anaesthetist, Royal Children's Hospital, Melbourne.

(b) Dr Michael King, a consultant anaesthetist, St Vincent's Hospital, Sydney.

## 9. How did the injury to Bella's finger occur?

- 9.1 After having lunch Bella and her parents visited the kangaroo feeding area, where Bella walked around the enclosure, patting and feeding the kangaroos. Following this, the family visited a number of other animal enclosures. Mary was carrying Bella at this time before she put her back in her pram.
- 9.2 As the family made their way to the exit, Bella wanted to get out of the pram, so her parents took her out. Bella ran up to a bird enclosure which consisted of three cages. A black cockatoo was on the ground in one of the cages, near the cage fence. Bella ran up to the cage to have a look at the bird and reached out with her right hand, placing it just inside the birdcage. As she did so, the black cockatoo bit the top of Bella's middle finger. Apollo describes the incident as happening very quickly.
- 9.3 It should be noted that following the incident on 4 February 2019, Billabong Zoo commissioned an independent audit of the wildlife park which took place between 22 and 24 July 2019. Further, steps were taken to erect additional fencing, approximately 1 metre high with warning signs, around the enclosure, warning visitors to the zoo that the birds may bite, and that the birds should not be touched or fed. Updated educational signage in respect of several species of birds was also introduced. Further, the Department of Primary Industries conducted an audit of Billabong Zoo in March 2019 and again in May 2021, and found that the Billabong Zoo was, relevantly, operating in compliance with the regulations and relevant standards.

9.4 **Conclusions:** It is evident that the injury to Bella's finger occurred after she was bitten by a black cockatoo that was located within its enclosure, an unfortunate accident with ultimately catastrophic consequences. The available evidence did not identify any issues associated with warning signage or fencing relating to the bird enclosure at Billabong Zoo that directly contributed to the accident.

## 10. Initial actions taken following Bella's presentation to PMBH

### *Assessment of injury, and decision to proceed to surgery*

- 10.1 Following a request for an orthopaedic consult from the emergency department, Dr Edirisinghe attended the emergency department to examine Bella's wound. Dr Edirisinghe noted a deep degloving laceration to the right middle finger going deep into the pulp, and further minor lacerations to the right index finger, with the distal phalanx and pulp of the phalanx of the right middle finger having been elevated. Dr Edirisinghe was concerned that there might be exposed bone beneath the elevated pulp, but was unable to conclusively confirm this without operative exploration.
- 10.2 After requesting that nursing staff gently re-bandage the wound, Dr Edirisinghe discussed the treatment plan with the on-call orthopaedic consultant, Dr Stuart Kennedy. Following discussions, Dr Kennedy and Dr Edirisinghe decided that the best treatment was to proceed to the operating theatre for operative debridement, washout and exploration of the contaminated wound, and repair of any damaged structures or lacerations under loupe magnification.

10.3 At the time, Dr Edirisinghe was an experienced registrar and Dr Kennedy considered that the proposed procedure was well within his level of expertise. Further, Dr Edirisinghe was content to proceed without Dr Kennedy's direct supervision.

10.4 **Conclusions:** An appropriate assessment of Bella's wound was conducted in the emergency department at PMBH, which included an orthopaedic consult. Given the nature of the wound, it was appropriate to proceed to surgery. Although the surgery did not eventually proceed, given that it was relatively straightforward and that Bella was otherwise well with no known complicating factors, the decision for Dr Edirisinghe to perform the surgery without direct consultant supervision was also appropriate.

#### *The decision to perform the procedure under general anaesthesia*

10.5 Dr Lawrence and Dr Zeloof discussed the anaesthetic plan for Bella. Dr Lawrence noted:

In a child as young as [Bella] who was emotionally upset and with limited cooperation, we felt that the only option would be for a general anaesthetic.

10.6 Dr Lawrence also noted that despite Bella being "*theoretically fasted*", the fact that she had been in pain and emotionally upset could have slowed her gastric emptying. Dr Lawrence also considered that it would be most appropriate to perform a general anaesthetic with an endotracheal tube rather than an LMA. Dr Zeloof was content to defer to Dr Lawrence's expertise regarding the risk of aspiration based on the small interval between when Bella had eaten and the injury.

10.7 Professor Davidson considered that it was an appropriate plan to perform the procedure under general anaesthesia, noting that regional anaesthesia was not an option for a patient of Bella's age. Further, Professor Davidson noted that the nature of her bite wound required a careful inspection and irrigation which could not be optimally done under sedation. Dr King also expressed agreement with the opinion expressed by Professor Davidson that the decision to proceed by way of general anaesthesia was appropriate.

10.8 **Conclusions:** Bella's age, the nature of her bite wound and the possibility of pulmonary aspiration all meant that the decision to perform the surgical procedure under general anaesthesia was appropriate.

#### *The method of anaesthesia*

10.9 As part of the anaesthetic plan, Dr Lawrence decided to avoid using muscle relaxants given that the surgical procedure was short, there were other methods for achieving appropriate intubation conditions, and the use of muscle relaxants is associated with a higher risk of anaphylaxis. Further, Dr Lawrence and Dr Zeloof decided to perform an intravenous induction of anaesthesia using fentanyl and propofol, followed by bag mask ventilation using sevoflurane in 100% oxygen, and then intubate once an appropriate depth of anaesthesia had been achieved. Anaesthesia would then be maintained with sevoflurane.

10.10 Professor Davidson noted that several options were available to the anaesthetic team in this scenario, and that “*the option chosen may be reasonably driven by personal preference and previous familiarity with a particular option*”. In Bella’s case, Professor Davidson considered the choice not to use a muscle relaxant to be a reasonable decision.

10.11 Professor Davidson noted that the utility of a RSI in children “*is an issue which is hotly debated*”. However, Professor Davidson considered that in Bella’s case a true modified rapid sequence induction was not actually performed; rather, a routine intravenous induction for a child in Bella’s age group was employed. However, given that a true RSI would most likely not be required, Professor Davidson considered the failure to actually perform one to not be poor practice. Further, Professor Davidson considered that the doses of propofol and fentanyl were appropriate, and that the concentration of sevoflurane administered was reasonable.

10.12 Both Professor Davidson and Dr King also agreed that the widely recognised formula for calculating the size of an appropriate ETT was followed, resulting in a size 4 ETT being selected in accordance with standard practice. Professor Davidson and Dr King also agreed that inflating the cuff of a size 4 or size 4.5 ETT would be expected to seal the airway in a child of Bella’s size and age.

10.13 Professor Davidson considered the use of an ETT as the airway option to be a safe option, particularly for an anaesthetist unfamiliar with using an LMA or face mask for a child of Bella’s age. Dr King similarly agreed that the choice of an ETT as the airway option was reasonable, although indicated that he personally would have used an LMA.

10.14 Overall, Professor Davidson noted:

In summary the induction technique, drugs used and doses were all easily justifiable and within what any reasonable anaesthetist would regard as acceptable practice.

10.15 Dr King similarly agreed that the induction technique, drugs used and dosages “*would all be considered reasonable and appropriate practice*”, and that not performing a RSI was also reasonable.

10.16 **Conclusions:** The induction technique, the decision to use an ETT as the airway option, the particular anaesthetic agents used and their doses were all appropriate. Further, the absence of a true rapid sequence induction was not contrary to acceptable anaesthetic practice. Whilst there may be reasonable variations in the method of anaesthesia amongst individual clinicians, there is no evidence that any of these factors contributed to the eventual clinical course.

## 11. Whether oesophageal intubation occurred

### *The First Intubation by Dr Zeloof*

11.1 Dr Zeloof gave evidence that he took the laryngoscope, opened Bella’s mouth and placed the laryngoscope in Bella’s mouth to expose the tracheal opening. At this stage Dr Zeloof estimated that he could only see about 20% of the glottis. However, after moving Bella’s larynx externally, Dr Zeloof gave evidence that this view improved to approximately 60% of the glottis, so that he could



see the majority of the glottic opening. Dr Zeloof considered that he had a view closer to a Grade 2A view at this point. Further, Dr Zeloof did not consider it to be particularly significant that he could not see the entire glottis, as he had encountered this situation previously in other cases.

- 11.2 Dr Zeloof gave evidence that he felt sufficiently skilled to perform intubation with the view that he had in Bella's case, and indicated that he had performed similar intubations, whilst under supervision, with the same view in other cases. Dr Zeloof noted that whilst the majority of these cases involved adult patients, some of them also involved paediatric patients.
- 11.3 Dr Zeloof also gave evidence that he was confident that he saw the ETT (**the First ETT**) pass through the glottis opening into the trachea, and expressed certainty that this had occurred. Further, Dr Zeloof gave evidence that if he felt any doubt at the time he would have either not passed the ETT or indicated that he was uncertain whether it was correctly placed in the trachea. Once satisfied that the ETT was in the trachea, Dr Zeloof removed the laryngoscope and gave evidence that he recalled nothing unusual at that point; indeed, Dr Zeloof gave evidence that everything seemed routine at that point in the procedure (**the First Intubation**).
- 11.4 Dr Lawrence did not have the view that Dr Zeloof had at this time. However Dr Lawrence gave evidence that Dr Zeloof verbalised what was occurring, and that he indicated that he was able to obtain a percentage of visible glottic opening (**POGO**) of 50% to 60%. Dr Lawrence described Dr Zeloof as being thorough and not rushing, estimating that the process of intubation took between 20 and 30 seconds. In evidence, Dr Lawrence described Dr Zeloof as passing the ETT, securing it with one hand, and the cuff then being inflated without incident.
- 11.5 Following inflation of the cuff there was an audible air leak. Dr Zeloof gave evidence that he continued to provide manual ventilation and observed Bella's chest rising and falling, and saw misting in the ETT. It was observed that Bella had oxygen saturations in the mid to low 80s, and so Dr Lawrence took over holding the ETT, and requested that Dr Seppi attend the OT.
- 11.6 Dr Lawrence and Dr Zeloof noted that the ETT had been inserted to a depth of 15 cm, and had earlier calculated that the most appropriate depth based on Bella's age was likely to be 12 cm. Dr Lawrence withdrew the ETT to 12 cm and again attempted ventilation. This did not result in any improvement in the cuff leak and Dr Lawrence felt from the bag that ventilatory pressure was hampered by the cuff leak. However, it was noted that there appeared to be improvement in Bella's chest rise and fall, and that oxygen saturations had increased to above 90%.
- 11.7 After Dr Seppi arrived, Dr Lawrence described the events that had taken place with the First Intubation and the difficulties encountered with ventilation. By this stage Bella's oxygen saturations had improved to 95% and it was noted that her blood pressure, pulse rate and the inflation pressure of the cuff were all considered to be appropriate.
- 11.8 At this point, Dr Zeloof had moved to the other side of the operating table and auscultated Bella's chest. He heard equal breath sounds bilaterally but noted that they were harsh and coarse wheezing sounds, and that they were likely upper airway breath sounds but he was not certain.

### ***The Second Intubation by Dr Lawrence***

- 11.9 Following some discussion, Dr Lawrence and Dr Seppi considered that further attempts at ventilation with the current ETT were not going to improve the situation. Therefore a decision was made to remove the first ETT and to place a larger size 4.5 ETT tube.
- 11.10 Dr Lawrence examined the First ETT via laryngoscope and saw that it was passing between the vocal cords. Dr Lawrence gave evidence that he initially struggled to get a good view, but was able to later obtain a Grade 2A view and saw that the First ETT was between the vocal cords. As the First ETT helped to hold the epiglottis up, Dr Lawrence gave evidence that he was able to obtain a Grade 2B view in order to see the back of the vocal cords.
- 11.11 Once the First ETT was removed Dr Lawrence estimated that he was able to obtain a POGO of around 50% and a Grade 2A view. Having agreed with Dr Seppi that it was appropriate to use a larger size 4.5 ETT, Dr Lawrence gave evidence that he was confident he saw the size 4.5 ETT (**the Second ETT**) pass between the vocal cords, and described it going through easily and without difficulty (**the Second Intubation**). The Second ETT was extended to the full 12 centimetres. After removing the laryngoscope the Second ETT was held in position with one hand by Dr Lawrence whilst connected to the breathing circuit.
- 11.12 Following this, RN Beauchamp inflated the cuff and Bella was ventilated. For the first two or three breaths no audible leak was detected and misting in the ETT was observed with chest rise and fall. However subsequently a small audible cuff leak was noted, although less than with the First Intubation. Dr Seppi subsequently auscultated Bella's chest and heard very loud and coarse sounds all coming from the upper airway.
- 11.13 The evidence established that the following are non-sensitive signs that an ETT has correctly been placed in the trachea:
- (a) Misting of the ETT;
  - (b) Chest rise and fall; and
  - (c) Air entry heard bilaterally.
- 11.14 Both Professor Davidson and Dr King gave evidence that basic anaesthesia training and advanced paediatric life support (**APLS**) training, together with abundant literature, teaches that the above are so called "*soft signs*", and do not reliably indicate tracheal intubation.
- 11.15 Conversely, the evidence also established the following are signs indicative of an incorrectly placed ETT:
- (a) A large air leak which did not resolve with cuff inflation;
  - (b) Coarse or harsh upper airway noise being heard upon auscultation of the chest;

(c) The absence of a persistent ETCO<sub>2</sub> waveform on capnography; and

(d) Distension of the stomach.

11.16 Professor Davidson noted that “*APLS training repeatedly emphasises that the most important indication that the ETT is in the trachea is if you clearly see it go into the trachea*”. Whilst both Dr Zeloof and Dr Lawrence gave evidence that they were sure they saw the First ETT and the Second ETT, respectively, pass into the trachea, Professor Davidson noted that “*paediatric laryngoscopy is not straightforward*” and that Dr Zeloof did not have a perfect view of the larynx.

11.17 Dr King noted that as Dr Zeloof had a Grade 2B view for the First Intubation (indicating that the vocal cords could not be seen) and that the First ETT had blood on it when removed (supporting that the first intubation had been difficult) it is “*entirely possible that Dr Zeloof may not have seen the tube actually passed between the cords*”.

11.18 **Conclusions:** Both Dr Zeloof and Dr Lawrence gave evidence of their certainty in seeing the First ETT and Second ETT, respectively, pass between the vocal cords indicating correct tracheal intubation. Both Dr Zeloof and Dr Lawrence were reassured that tracheal intubation had in fact occurred given their observations of misting of the ETT, chest rise and fall, and bilateral air sounds.

11.19 However, three important factors weigh against these expressions of certainty, and against the likelihood of correct tracheal intubation. First, the expert evidence established that laryngoscopy for paediatric patients is inherently complicated compared to adult patients. Second, the observation of blood on the First ETT after it was withdrawn, together with the autopsy findings of a superficial linear tear present in the mucosa of the oesophagus, indicate the likelihood of oesophageal intubation. Third, the persistent air leak despite cuff inflation, coarse or harsh sounds in the upper airway, the absence of a persistent ETCO<sub>2</sub> waveform and distension of the stomach are all positive signs indicating oesophageal intubation.

11.20 Having regard to the matters identified above, and the opinions expressed by both Professor Davidson and Dr King, the available evidence supports a finding that both the First ETT and the Second ETT were placed in the oesophagus, and that this oesophageal intubation was not recognised, despite a number of indicators being apparent.

## 12. Appropriateness and adequacy of response to Bella’s condition during surgery

12.1 Consideration of the appropriateness and adequacy of actions taken in response to Bella’s condition during surgery is divided into the following sections.

### *ETCO<sub>2</sub> waveforms*

12.2 Dr Zeloof gave evidence that following the First Intubation he observed small ETCO<sub>2</sub> waveforms which appeared to be “*sawtooth*” in nature. When asked whether the waveforms were of a height that would normally be expected, Dr Zeloof gave evidence that he did not have much paediatric experience as at February 2019, but considered that the ETCO<sub>2</sub> waveforms that he saw were not the

usual amplitude that would be seen when ventilating a patient. Notwithstanding, Dr Zeloof gave evidence that he did not place any significance on the appearance of the ETCO<sub>2</sub> waveforms at the time.

- 12.3 Following the First Intubation, Dr Lawrence gave evidence that he checked the capnography and observed that there were low value readings. When asked whether he considered this to be significant at the time, Dr Lawrence gave evidence that he felt that the low ETCO<sub>2</sub> waveforms could be explained by equipment malfunction (given that the filter had to be tightened prior to the First Intubation) or by bronchospasm. Dr Lawrence agreed in evidence that his training had taught him to give consideration to the capnography, with no high amplitude ETCO<sub>2</sub> waveforms suggesting that there was a problem, with one problem being incorrect ETT placement.
- 12.4 Following the Second Intubation, Dr Lawrence gave evidence that prior to Dr Seppi auscultating Bella's chest he observed three ETCO<sub>2</sub> waveforms on the monitor, and after Dr Seppi advised of his findings (coarse and upper airways sounds) Dr Lawrence looked at the ETCO<sub>2</sub> trace again and observed around 10 ETCO<sub>2</sub> waveforms of low amplitude. Dr Lawrence gave evidence that he considered these observations to be consistent with Dr Seppi's findings of a wheeze on auscultation.
- 12.5 Both Professor Davidson and Dr King described persistent ETCO<sub>2</sub> waveforms as being the gold standard for correct ETT placement, with a correctly positioned ETT normally being associated with persistent high amplitude (30mmHg or more) CO<sub>2</sub> readings. Professor Davidson noted that if the ETT is not in the trachea then a high amplitude wave may appear initially but would subsequently quickly disappear altogether or a very low amplitude wave may persist. Both Professor Davidson and Dr King agreed that no normal amplitude ETCO<sub>2</sub> waveforms were seen. Indeed, Dr King noted one CO<sub>2</sub> reading of 25mmHg and another of 10mmHg prior to the sevoflurane being administered, which is consistent with the period of pre-oxygenation prior to induction. Further, Dr King noted that following induction there were no markings on the trend printout consistent with CO<sub>2</sub> recordings above 2 or 3mmHg.
- 12.6 Both Dr King and Professor Davidson agreed that the need for persistent ETCO<sub>2</sub> waveforms of high amplitude in order to confirm that an ETT is correctly placed in the trachea is basic anaesthesia training and is emphasised in APLS training. Indeed, Dr King noted that this skillset is not confined to paediatric anaesthetists.
- 12.7 In his evidence, Dr Lawrence raised a number of alternative explanations for the low amplitude ETCO<sub>2</sub> waveforms, namely the possibility of equipment failure, a kinked or obstructed ETT, and severe bronchospasm. Whilst Professor Davidson considered that these explanations were possible in theory, the combined expert evidence established that they were not likely in Bella's case, given the following:
  - (a) Both Professor Davidson and Dr King noted that any apparent equipment failure would have been apparent at the time.

- (b) If a kinked tube or bronchospasm had been present no breath sounds would have been produced as resistance would have been too high, and there would have been an absence of chest rise and fall.
- (c) Professor Davidson agreed with the proposition that bronchospasm can be described as being on a spectrum, and that various clinical features will reflect the degree of bronchospasm in a particular case. However, both Professor Davidson and Dr King noted that if suspected bronchospasm had been severe enough in Bella's case to produce no ETCO<sub>2</sub> waveforms, then chest rise and fall and breath sounds would not be expected if the lungs were being ventilated.
- (d) Dr King noted that in a case of extremely severe bronchospasm with a correctly placed ETT it is possible that there would be negligible or no ETCO<sub>2</sub> waveforms as there is no effective ventilation occurring. However, in such a situation, Dr King expressed the view that he would expect breath sounds to be absent and chest movement to be minimal, neither of which was the case for Bella. In addition, Dr King noted that with a correctly placed ETT if there was sufficient ventilation to enable actual breath sounds and a rise and fall of the chest, he would expect the ETCO<sub>2</sub> readings to be much greater than 2 to 3mmHg.

12.8 Overall, both Professor Davidson and Dr King expressed the belief that the absence of persistent ETCO<sub>2</sub> waveforms should have alerted the clinicians to the possibility of a misplaced ETT. However, as is discussed further below, both experts acknowledged the stressful situation and the speed at which events in the OT were unfolding. In these circumstances, both experts also acknowledged that it would have been relatively easy for the members of the anaesthetic team to miss a clinical indicator or to become fixated on another possible reversible cause of Bella's deteriorating condition.

12.9 Both Professor Davidson and Dr King agreed that the actions to treat suspected bronchospasm and anaphylaxis were appropriate, with the important qualification that the decision to consider anaphylaxis as a diagnosis would only have been reasonable if incorrect ETT placement had been excluded, which it had not been.

### ***Ventilation***

12.10 Although ventilation was not optimal following both the First Intubation and the Second Intubation, Dr Lawrence considered that the rise and fall of Bella's chest and rising oxygen saturations indicated correct placement of the ETT. However, Professor Davidson noted that in infants and small children it is possible to provide some degree of ventilation of the lungs without the ETT being in the trachea. Professor Davidson noted that an ETT may be in the pharynx or in the upper oesophagus but that if there is sufficient interest laryngeal pressure, ventilation may occur. Whilst such ventilation is not optimal, it is enough to prevent profound hypoxaemia. Professor Davidson noted that this is not something which occurs with adult patients:

This is something that most experienced paediatric anaesthetist[s] would recognise but it does not appear in any textbook or teaching that I am aware of. An inexperienced paediatric anaesthetist may not be aware that a misplaced ETT can provide enough ventilation to prevent a hypoxic arrest for some time.

12.11 Dr King gave evidence that before reading Professor Davidson's report he was not aware of the concept of an ETT in the oesophagus enabling adequate ventilation in a paediatric patient. However, whilst he had not personally encountered such a situation, and had not seen it described, previously, he considered that it was plausible. Dr King also noted that as an LMA in the pharynx allows for a patient to be successfully ventilated, so too could an ETT in the pharynx allow ventilation to occur as the nose and mouth of a paediatric patient is more easily occluded to enable positive pressure.

### ***Resuscitation***

12.12 Professor Davidson noted that the APLS guidelines indicate that the position of the ETT should be confirmed in an ongoing hypoxic arrest, and considered the failure to do so to be an omission in Bella's resuscitation. This is because there may be initial misplacement or displacement during resuscitation. A direct laryngoscopy or chest x-ray should have been performed to confirm the position of the ETT.

12.13 Dr King agreed with the opinion expressed by Professor Davidson whilst noting that waiting for equipment and personnel to perform a chest x-ray may have been problematic. Dr King noted that a further option (if available) would have been to pass a fibre-optic bronchoscope down the ETT to see if the trachea could be visualised. In the absence of any of the three above options, the ETT should have been removed and bag and mask ventilation attempted or some form of supraglottic airway such as an LMA utilised.

### ***Environmental considerations***

12.14 One important consideration which bore upon the actions of the treating team concerned the environment within which each of the anaesthetists found themselves in within OT1 at the time. This was variously described in evidence as follows:

- (a) Dr Zeloof gave evidence that he was "*trying to process a lot of things*".
- (b) Dr Lawrence described the environment as "*controlled chaos*" with "*lots of things going on, lots of conversation, lots of instructions fired*".
- (c) Dr Seppi described the environment as not conducive to "*calm thinking*" and described descending into a "*vortex*" where it was challenging to think rationally and for the mind to "*make sense of the chaos*".

12.15 These environmental considerations are significant in at least two respects:

- (a) First, after arriving in the OT Dr Seppi gave evidence that he could not reconcile the sound of the air leak, the distension of Bella's stomach, Bella's oxygen saturations and the bilateral breath sounds. Dr Seppi gave evidence that these observations caused him to consider that the First ETT was not placed correctly, and to ask, "*Is it in?*". Dr Seppi gave evidence that the aim of asking this question was to "*open up consideration*" of whether the ETT was in the trachea.

Further, Dr Seppi gave evidence that Dr Zeloof responded with words to the effect of, “*No, we checked it, it’s in*”.

In contrast, both Dr Zeloof and Dr Lawrence gave evidence of having no recollection of hearing the question reportedly asked by Dr Seppi, although Dr Lawrence acknowledged the possibility that the question may have been asked but that he did not hear it.

- (b) Second, Dr Seppi gave evidence that he shouted out, “*We need to take the tube out*”, immediately after Dr Zeloof called a cardiac arrest. Dr Seppi described this as a “*desperate cry for help*” on his behalf to the rest of the OT. Further, Dr Seppi gave evidence that he could not recall hearing any response.

In his evidence, Dr Lawrence said that he had no recollection of Dr Seppi making any reference to removing the ETT, whilst acknowledging the possibility that it may have been said and missed during the “controlled chaos at the time”. However, Dr Lawrence gave evidence that he was certain that at no point did he hear any suggestion that the ETT was in the wrong place.

12.16 The environmental considerations identified above were acknowledged by the experts in their evidence. Professor Davidson noted that the environment which confronted the clinicians on 4 February 2019 was likely “*very stressful*” with events happening quickly. In such circumstances, Professor Davidson acknowledged that it would be easy to miss something or to fixate on something else.

12.17 Similarly, Dr King acknowledged that the process of trying to rationalise the possibility of ETT misplacement was not an easy one. Dr King also acknowledged that it would have been easy for the clinicians to become fixated on one possibility and to consider an explanation other than ETT misplacement if the belief was that the ETT had been seen to pass through the vocal cords. In such a situation, Dr King acknowledged that it would be difficult to “*go back to basics*”.

12.18 As at February 2019, Dr Zeloof had no previous experience with encountering a cuff leak during provision of anaesthesia care in a clinical situation. Further, Dr Zeloof gave evidence that, at the time, he did not have in his mind the possibility of oesophageal intubation. Instead, Dr Zeloof indicated that he was attempting to identify positive signs that the ETT had been correctly placed. Ultimately, Dr Zeloof gave evidence that he accepted, with appropriate reflection and the benefit of hindsight, that, at the least, the low amplitude ETCO<sub>2</sub> waveforms and distended stomach ought to have prompted investigation to confirm whether the ETT was in fact correctly placed.

12.19 In his evidence, Dr Lawrence acknowledged that he had become fixated on one reversible cause for Bella’s deterioration (namely bronchospasm) to the exclusion of others. Dr Lawrence also gave evidence that “*in the pressure of the situation*”, and given that he had visualised the respective ETTs twice, he did not entertain the idea that the ETT had become dislodged. Dr Lawrence acknowledged that this was an error on his part. Similarly, Dr Lawrence also acknowledged that it was an error on his part to not correlate the low amplitude ETCO<sub>2</sub> waveforms and distended stomach with the possibility of ETT misplacement. Again, Dr Lawrence gave evidence that the

events in the OT were occurring in “*stressful circumstances*”, and indicated his wish that different actions had been taken at the relevant time.

12.20 When asked what action ought to have been taken in response to Bella’s presentation, Professor Davidson indicated some difficulty in expressing an opinion without being able to synthesise the events in real time, and that it would be easy to now use a “*retrospectoscope*” with the benefit of hindsight. Notwithstanding, Professor Davidson indicated that, based on his personal experience, if confronted with a clearly audible air leak, the absence of persistent high amplitude ETCO<sub>2</sub> waveforms, and coarse or harsh wheezing noises he would consider that the ETT had not been correctly placed. In response, Professor Davidson indicated that he would remove the ETT and perform a repeat laryngoscopy with bag and mask ventilation. Dr King gave evidence that he would have responded in a similar manner, based on his experience of having previously encountered situations of oesophageal intubation which had been recognised quickly.

12.21 Further to above, Professor Davidson noted the challenges associated with removing an ETT and using an alternate airway or waking up a paediatric patient if a clinician considered that the one thing they had definitely gotten correct was placement of the ETT in the trachea. In such circumstances, Professor Davidson gave evidence that it is understandable that a clinician would, in such circumstances, be loath to remove the ETT and perform a repeat laryngoscopy.

12.22 **Conclusions:** A constellation of signs on 4 February 2019 ought to have alerted the members of the anaesthetic team to both the First ETT and Second ETT being in the oesophagus, rather than the trachea. Principal among these signs was the absence of persistent, high amplitude ETCO<sub>2</sub> waveforms, with audible air leak, coarse and harsh breath sounds in the upper airway and a distended stomach also indicative of oesophageal intubation. The collective failure of the anaesthetic team to recognise ETT misplacement was an error. Further, given that the cause of Bella’s deterioration was recognisable and reversible, it follows that her death was preventable.

12.23 Recognition of ETT misplacement required the synthesising of various indicators in an environment that was challenging and with a patient that was clinically deteriorating. If such a synthesis had occurred, it likely would have resulted in recognition of ETT misplacement and prompted the ETT being removed and a repeat laryngoscopy being performed, or Bella being woken from her anaesthesia.

12.24 Instead, no such synthesis occurred and instead the anaesthetic team became anchored in their thinking and fixated upon other reversible causes of Bella’s deterioration. Whilst the treatment instituted in relation to these reversible causes was appropriate, this treatment obviously did not address the actual cause of Bella’s deterioration.

12.25 A number of factors contributed to the fixated thinking described above. First, mention has already been made of the environmental considerations described above. Second, there was an understandable reluctance by the anaesthetic team to consider ETT removal in circumstances where the clinicians were confident of having seen the respective ETTs pass through the vocal cords. Third, the members of the anaesthetic team were unaware of the possibility that a misplaced ETT could still allow for adequate ventilation of a paediatric patient.



### 13. What was the cause of Bella's death?

13.1 Both Professor Davidson and Dr King agreed that there is substantial evidence to suggest that the cause of Bella's death was an unrecognised misplacement of the ETT into either the oesophagus or lower pharynx. This occurred due to the ETT being passed into the oesophagus on intubation or the ETT moving from the larynx or trachea to the oesophagus immediately after intubation. Both Professor Davidson and Dr King noted that the autopsy report (which identified a superficial linear tear present in the closer of the oesophagus, together with areas of haemorrhage in the upper third of the oesophagus and pharynx) and postmortem radiology report (which described the ETT terminating in the oesophagus at T3 level, with balloon inflated) support this conclusion.

13.2 Both Professor Davidson and Dr King also agreed that it is very unlikely that anaphylaxis was the cause of death. Dr King noted that the normal postmortem tryptase level "*virtually excludes anaphylaxis as having occurred*", with the understanding that the tryptase level will increase within minutes of the onset of anaphylaxis. Additionally, Dr King noted that whilst non-anaphylaxis bronchospasm is possible, he considered it to be unlikely due to the expected differences in breath sounds, ETCO<sub>2</sub> waveforms, abdominal distension and the large ETT cuff leak.

13.3 **Conclusions:** The cause of Bella's death was unrecognised oesophageal intubation. The indicators described above and the postmortem radiology and autopsy findings support this conclusion. Similarly, Bella's presentation on 4 February 2019 and the autopsy findings exclude the possibility of bronchospasm or anaphylaxis, respectively, as causing death.

13.4 It is not possible to be precise as to whether oesophageal intubation occurred as a direct result of the First Intubation and Second Intubation, or as a result of the First ETT and Second ETT becoming subsequently dislodged. As to the latter, the evidence indicates that dislodgement could have occurred upon the laryngoscope being removed, or upon the cuff being inflated. Notwithstanding, the evidence also establishes that oesophageal intubation occurred early in the process and was the direct cause of Bella's presentation and subsequent deterioration.

### 14. Is it necessary or desirable for any recommendations be made in relation to Bella's death?

14.1 In relation to the issue of possible recommendations, a number of matters arose for consideration during the coronial investigation and the course of the inquest.

#### *Experience and qualifications of the anaesthetic team members*

14.2 In August 2017 Dr Zeloof was accepted into the ANZCA anaesthesia training program as an early Advanced Trainee, having been given an exemption from completing basic training and the primary examination by virtue of completing two years of anaesthetics and passing equivalent examinations in the United Kingdom.

14.3 Dr Zeloof commenced working as an anaesthetic registrar at Royal North Shore Hospital (**RNSH**) in Sydney. Commencing in January 2019, Dr Zeloof began work as an anaesthetic registrar at PMBH as part of a regional placement. As at February 2019 Dr Zeloof had limited training and experience in paediatric anaesthesia, with most of his paediatric experience being in the United Kingdom

where, over a period of a few months, he treated approximately four or five paediatric patients a fortnight during dental extraction procedures. On each occasion, Dr Zeloof did so under the supervision of a consultant anaesthetist.

- 14.4 In Australia, most of Dr Zeloof's paediatric experience was on an ad hoc basis at RNSH where he assisted with between 10 and 15 emergency surgical cases where paediatric patients were required to undergo treatment. On each occasion, Dr Zeloof's involvement was under the full supervision of a consultant anaesthetist or provisional fellow.
- 14.5 By February 2019 Dr Zeloof had completed his final examinations for the anaesthesia training program, but had not yet completed a specialised study year in paediatric anaesthesia. Dr Zeloof's first on-call shift during his first week as an anaesthetic registrar was on 4 February 2019, which he believes was his sixth day at PMBH. Prior to this, Dr Zeloof did not have any experience in a regional hospital setting, and was still familiarising himself with the types of resources available and cases managed in such a setting.
- 14.6 Dr Lawrence completed his ANZCA fellowship in the beginning of 2018. During this period, Dr Lawrence completed two 6-month rotations, which included paediatric anaesthesia experience, in 2012 and 2013. Dr Lawrence also underwent paediatric specific training during a 3-month rotation in 2016. Between early 2018 and February 2019 Dr Lawrence only had occasional paediatric anaesthesia lists at PMBH. Due to the limited number of anaesthetic cases at PMBH involving patients under the age of two years, Dr Lawrence likely would have only been involved in one or two such cases whilst working as a consultant at PMBH prior to February 2019.
- 14.7 Whilst acknowledging that any assessment as to whether the qualifications and experience of an anaesthetic team would be inherently subjective, neither Professor Davidson nor Dr King was critical of the decision to proceed with anaesthesia, given the relevant experience and qualifications of Dr Zeloof and Dr Zeloof. Both experts noted that:
- (a) Dr Lawrence had recently completed his fellowship and had experience with paediatric cases in the preceding 12 months.
  - (b) Dr Lawrence ensured that a senior anaesthetic consultant was available.
  - (c) Bella was otherwise well, that her weight was around 10 kilograms and that the surgical procedure was relatively straightforward.
  - (d) Dr Zeloof was a reasonably senior anaesthetic registrar with some experience in paediatric cases. Indeed, Professor Davidson noted that if Bella had arrived at the tertiary facility where he ordinarily practices and Dr Zeloof was a senior trainee he would be expected to perform the procedure without supervision, although in a setting where an intensive care unit was available.

14.8 Relevantly, Dr King noted:

“[T]he term “paediatric anaesthetist” is poorly defined and is essentially a subjective description. It can include anything from an anaesthetist whose practise involves the provision of purely paediatric services in tertiary specialist paediatric hospitals to an anaesthetist who provides anaesthetics to healthy child patients on a once a fortnight ENT list for insertion of grommets. The provision of an anaesthetic to a healthy child like Emiliana is probably performed in NSW more by the latter than the former.

14.9 **Conclusions:** Given the respective experience and qualifications of both Dr Zeloof and Dr Lawrence, and the availability of Dr Seppi as an experienced consultant anaesthetist, it was appropriate for anaesthetic care to be provided to Bella on 4 February 2019.

***Applicable guidelines governing provision of anaesthesia to paediatric patients at PMBH***

14.10 As at February 2019, there were no written paediatric anaesthesia guidelines in place at the Mid North Coast Local Health District (**MNCLHD**), within which PMBH is located. In evidence, Dr Zeloof was asked whether he made any enquiry of Dr Lawrence regarding whether any policy existed for provision of anaesthesia to a patient of Bella’s age. Dr Zeloof gave evidence that Dr Lawrence indicated that he was content for anaesthesia to be provided and for the case to proceed. Further, Dr Zeloof gave evidence that when he discussed respective roles for the procedure with Dr Lawrence he had an understanding (from a recent examination) of guidance provided by the Australian and New Zealand College of Anaesthetists (**ANZCA**) regarding it to be good practice for a second anaesthetist to be present.

14.11 Dr Lawrence gave evidence to a similar effect. He indicated that as at February 2019 he was not aware of any written policy regarding the ages of children undergoing anaesthesia. Instead, Dr Lawrence gave evidence that it was “*unspoken*” that if a child under the age of two was provided with anaesthesia, there should be two anaesthetists available in the facility, but not necessarily in the operating theatre.

14.12 Section 2.2 of the ANZCA *Statement on Anaesthesia Care of Children in Healthcare Facilities Without Dedicated Paediatric Facilities (Review PS29, 2008)* relevantly provided in relation to staff training and experience:

Specialist anaesthetists are expected to have training in the care of infants and children. However individual anaesthetists may have varying recent experience in managing anaesthesia for children. They should not be required to provide anaesthesia care without regular clinical exposure to an extent necessary to maintain a comfortable with their competence.

There will often be of benefit for a second anaesthetist to be present, to act as a skilled assistant for the care of infants and children classified as ASA 3 or greater.

14.13 Since February 2019 formal guidelines have now been developed which outline the processes of assessment and anaesthetic management of paediatric patients at both PMBH and Coffs Harbour Health Campus (**CHHC**), the latter of which is also located within the MNCLHD. These guidelines were initially developed at PMBH by a team of five specialists anaesthetists, with the ANZCA

*Guideline for the Provision of Anaesthesia Care to Children (2020)* used as an authoritative resource.

14.14 Initially, on 15 December 2020, the *Guidelines for the Provision of Anaesthesia Services to Children at Port Macquarie Base Hospital (the PMBH 2020 Guidelines)* were published. Following this, on 24 June 2021, an updated version of the PMBH 2020 Guidelines was approved (**the PMBH 2021 Guidelines**). A similar version of these guidelines were published for CHHC on 17 February 2021, with an updated version approved on 24 June 2021 (**the 2021 CHHC Guidelines**).

14.15 Initially, the PMBH 2020 Guidelines were drafted to include a section on the specific scope of local paediatric patients, similar to the relevant guidelines in effect at CHHC. However, Dr Logan Carroll, the Deputy Director of Medical Services at the Hastings Macleay Clinical Network within the MNCLHD, indicated that regrettably, for reasons unknown, this section was omitted from the published version. This issue was subsequently addressed in the PMBH 2021 Guidelines which provide for local management guidelines for planned surgery as follows:

Paediatric patients presenting for anaesthesia care will:

1. have completed their 12th month of postnatal age
2. be weighing at least 10 kg
3. be classified as ASA status one or two
4. not undergo surgery of more than moderate complexity or requiring post-operative care that cannot be provided safely on the general paediatric ward
5. required the presence of two specialist anaesthetists:
  - i. if they have not completed the 24th month of postnatal age
  - ii. both specialist must be present in the OT during the induction of anaesthesia
  - iii. the second anaesthetist must be immediately available within the theatre suite complex for the duration of the anaesthesia care episode [original emphasis]

14.16 The PMBH 2021 Guidelines go on to provide that if emergency surgery is required in the after-hours period, then paediatric patients presenting for anaesthesia care will fulfil the same criteria as points 1 to 5 above, and that if any of the criteria cannot be met then *“early transfer of care to a medical facility with high levels of paediatric expertise must be organised expeditiously, unless such transfer is deemed, after mutual agreement by the anaesthetist and the treating surgeon, to be associated with a substantially worse patient outcome proceeding with care at [PMBH]”*. Further, the PMBH 2021 Guidelines also provide that if such anaesthesia care is to proceed at PMBH due to the nature of an emergency and its urgency then the clinical team will need to adapt and utilise available resources which will include attempting to summon a second specialist anaesthetist, consideration being given to enlisting specialist paediatric medical and intensive care unit/emergency department physician assistants, and seeking distant expert advice as required.

14.17 Dr King noted the positive aspects of a local management guideline, but drew attention to the slight variation between the 2021 PMBH Guideline and the 2021 CHHC Guideline, with the latter containing no provision for the weight of a paediatric patient to be provided with anaesthesia services. Dr King considered that this may lead to care being withheld from certain patients (for

example if their weight was just below 10 kilograms) and that it may be appropriate to omit any weight criteria entirely, or to express such a criteria based on the relevant percentile of height and weight for age. Notwithstanding, Dr King acknowledged that the MNCLHD is best placed to consider the impact of provision of anaesthesia services to paediatric patients based on its resources and whether the level of prescription is appropriate between hospitals.

14.18 Professor Davidson gave evidence that he considered the guidance provided by the MNCLHD to be “*very appropriate*” and acknowledged the difficulties associated with determining the appropriate degree of latitude to be allowed in individual cases.

14.19 **Conclusions:** As at February 2019, no formal written guidelines were in place at PMBH which governed the provision of anaesthesia care to paediatric patients. Instead, individual clinicians had an understanding of, and implemented in practice, an aspect of a relevant ANZCA statement which existed at the time regarding a second anaesthetist being present for the provision of such care. The PMBH 2021 Guidelines now provide for appropriate local management guidelines in relation to the provision of anaesthesia care to paediatric patients. Whilst challenges exist in determining the level of prescription in formulating such guidelines, it is evident that the MNCLHD is best placed to determine this issue having regard to availability of resources and the nature of paediatric patient cohorts that present to PMBH.

### ***Networks to facilitate maintenance of skills for clinicians***

14.20 Section 7 of the ANZCA *Guideline for the Provision of Anaesthesia Care to Children (PS29, 2020)* deals with an expectation that an anaesthetist providing anaesthesia care to children should ensure that they maintain the necessary skills and competence to do so. Relevantly, section 7.4 provides that:

Regional centres should support the efforts of anaesthetists seeking to maintain skills in paediatric anaesthesia by establishing networks and arrangements to facilitate maintenance of skills and currency of practice. In addition, there should be support for anaesthetist to attend operative/meetings relevant to their scope of practice.

14.21 Section 10.3 of the ANZCA *Guideline for the Provision of Anaesthesia Care to Children - Background Paper, PS29BP (2020)* provides that:

Australia and New Zealand face the dual challenges of sparse populations and geographically remote locations. Maintaining competence and, equally important, the confidence to treat children when exposed to lower volumes of practice can be difficult. Maintaining skills can take a variety of forms: direct care, CPD activities, refresher and scenario-based courses, and visits to other centres. There should be established networks and arrangements in place to facilitate supernumerary attachments or secondments to high volume or specialist centres. Regional networks should facilitate and support joint CPD activities specific to paediatric practice and health networks should support the time required to undertake these activities.

14.22 Dr Caroll indicated that PMBH has undergone a process of establishing closer formal interdepartmental networks with The Children’s Hospital at Westmead (**CHW**) in order to establish additional educational support and direct lines of communication. The development of such an

effective support network is being coordinated with Dr Sally Wharton, anaesthetist and Medical Simulation Co-Lead within the Sydney Children's Hospitals Network.

14.23 In June 2021 a PMBH anaesthetist and senior nurse completed a four-day secondment to the CHW for the purpose of system knowledge acquisition/comparison and a procedural refresher. Due to the effects of the COVID-19 pandemic larger scale interdepartmental face-to-face educational interactions have not occurred. However this area of improvement is still being sought.

14.24 Further, plans have been made for Dr Wharton to conduct a reciprocal visit to PMBH in March 2022, for the purpose of assisting resident colleagues in building and advising on the paediatric content of anaesthesia scenario simulation. Such simulation training commenced at PMBH in April 2020, led by a specialist, senior nurse and simulation technical assistant. Specific paediatric emergency anaesthetic simulations were conducted in April and July 2020 on paediatric anaphylaxis, with airway management and integral part of the scenario constructed. The scenarios addressed both basic and advanced airway management techniques with an ETT, including emphasis on checking its positioning under difficult circumstances. Advanced life support simulations were also conducted in February and June 2021, with two paediatric simulations/practical sessions conducted in July 2021 focusing on paediatric laryngospasm and neonatal resuscitation. It is intended that these will be annually recurring events, with locally managed simulation and off-site video link conferencing, to support the overall simulation program throughout the year. Further, it is part of the overall system improvements that the PMBH Department of Anaesthesia develop a network for interdepartmental communication and education with the CHW.

14.25 Both Professor Davidson and Dr King agreed that such simulation training can assist in exposing practitioners to challenging settings and improving overall clinical teamwork. In particular, Professor Davidson noted that a regional anaesthetist might be at the "*edge of their comfort zone*" and that good simulation training would be a useful addition to improving patient safety.

14.26 Both Professor Davidson and Dr King endorsed the association between regional hospitals and tertiary level hospitals to be an excellent concept that assists with the training and up skilling of clinicians. Professor Davidson noted that such an association is useful in maintaining contact between facilities and ensuring patient safety in anaesthetic settings. Further, Dr King described such associations as being an excellent concept that provide training opportunities for relevant staff.

14.27 **Conclusions:** PMBH has taken appropriate steps to develop an effective support network with a tertiary paediatric facility. Such a network allows for improvements in staff training and the development of appropriate clinical skills. Further, such a network provides support for simulation training which has been introduced, some of which seeks to address the challenges faced by clinicians on 4 February 2019, and provide for improved outcomes.

14.28 Having regard to each of the matters set out above, it is neither necessary nor desirable for any recommendations pursuant to section 82 of the Act to be made.

## **15. Findings pursuant to section 81 of the *Coroners Act 2009***

15.1 Before turning to the findings that I am required to make, I would like to acknowledge, and express my gratitude to Mr Jake Harris, Counsel Assisting, and his instructing solicitor, Ms Connie Livanos of the Department of Communities and Justice, Legal. The Assisting Team has provided outstanding assistance during the conduct of the coronial investigation and throughout the course of the inquest. I am also extremely grateful for the sensitivity and empathy that they have shown throughout the course of this distressing matter.

15.2 I also thank Detective Senior Constable David Halverson of Port Macquarie Detectives for conducting a comprehensive investigation and providing support to Bella's parents throughout the coronial process.

15.3 The findings I make under section 81(1) of the Act are:

### ***Identity***

The person who died was Emiliana Belle Obusan.

### ***Date of death***

Emiliana died on 4 February 2019.

### ***Place of death***

Emiliana died at Port Macquarie Base Hospital, Port Macquarie NSW 2444.

### ***Cause of death***

The cause of Emiliana's death was unrecognised oesophageal intubation.

### ***Manner of death***

The unrecognised oesophageal intubation occurred during anaesthesia care provided to Emiliana in preparation for surgery to treat a bite wound to her right middle finger. This wound occurred when Emiliana was accidentally bitten by a black cockatoo whilst visiting an animal wildlife park. The oesophageal intubation resulted in sudden deterioration of Emiliana's condition. Despite a number of indications being apparent as to the reversible cause of Emiliana's deterioration, these indications were not recognised and, consequently, appropriate therapies to preserve Bella's life were not instituted.

## **16. Epilogue**

16.1 On behalf of the Coroner's Court of New South Wales and the Assisting Team, I offer my deepest sympathies, and most sincere and respectful condolences, to Mary, Apollo and Isaac; and to Bella's extended family and loved ones for their most painful and devastating loss.

16.2 At the conclusion of the evidence in the inquest, Mary and Apollo showed extraordinary generosity in sharing some incredibly moving and treasured memories of Bella with those in the courtroom. One memory that Apollo has is singing Bella's favourite songs to her each night when putting her

to sleep. Is perhaps appropriate to conclude with some lyrics from one of these songs, “*You’ll Be In My Heart*”:

*For one so small, you seem so strong  
My arms will hold you, keep you safe and warm  
This bond between us, can't be broken  
I will be here, don't you cry  
'Cause you'll be in my heart  
Yes, you'll be in my heart  
From this day on, now and forever more  
You'll be in my heart  
No matter what they say  
You'll be here in my heart  
Always*

16.3 I close this inquest.

Magistrate Derek Lee  
Deputy State Coroner  
19 November 2021  
Coroner’s Court of New South Wales