



IN THE CORONERS COURT  
OF VICTORIA  
AT MELBOURNE

Court Reference: COR 2017 002066

**FINDING INTO DEATH WITHOUT INQUEST**

*Form 38 Rule 60(2)*

*Section 67 of the Coroners Act 2008*

Findings of:	Peter Charles White, Coroner
Deceased:	Emma Kate McGrath
Date of birth:	27 March 1998
Date of death:	3 May 2017
Cause of death:	Meningococcal septicaemia
Place of death:	Ballarat

I, PETER CHARLES WHITE, Coroner,  
having investigated the death of EMMA KATE McGRATH  
without holding an inquest:  
find that the identity of the deceased was EMMA KATE McGRATH  
born on 27 March 1998  
and that the death occurred on 3 May 2017  
at Ballarat Base Hospital, 1 Drummond Street North, Ballarat, Victoria 3350

**from:**

I (a) MENINGOCOCCAL SEPTICAEMIA

Pursuant to section 67(1) of the **Coroners Act 2008**, I make findings with respect to **the following circumstances:**

1. Ms McGrath was the 19-year old daughter of Abigail and Justin McGrath and lived with her parents and two brothers in Ballarat. She completed her Year 12 studies at Loretto College in 2016 and commenced a Nursing/Paramedics degree at Aquinas College University in 2017.
2. Ms McGrath ordinarily enjoyed good health and had undergone all routine childhood vaccinations. In addition, she received all recommended vaccinations for travel to Cambodia between high school and university and was in good health, with relevant vaccinations current, when she underwent a fitness test in anticipation of starting the clinical component of her Nursing/Paramedics degree. Ms McGrath's previous medical history included tonsil- and adenoidectomies, appendectomy, glandular fever, shingles producing ongoing fatigue for which she received monthly B12 injections and viral oral blisters in around April 2017.
3. At about 6am on 2 May 2017, Ms McGrath went with her mother to 'boot camp' before attending university. When she returned home that evening, Ms McGrath appeared unusually stressed and emotional about a forthcoming assignment. She went to bed as usual around 9.30pm.
4. Around midnight on 3 May 2017, Ms McGrath woke her mother complaining of feeling sick and being unable to get warm despite wrapping herself in a blanket. Mrs McGrath gave her daughter some paracetamol and ibuprofen for an elevated temperature and stayed with her in bed.
5. Around 1am, Ms McGrath reported feeling nauseous and by 2am she had vomited a couple of times, showered and returned to bed with additional symptoms of head and abdominal pain. Mrs McGrath offered to take her daughter to the hospital but Ms McGrath declined, thinking she was likely experiencing influenza or a gastrointestinal ailment. The analgesia appeared to have reduced Ms McGrath's temperature and she was able to sleep for a couple of hours.

6. At 6am, Ms McGrath vomited again. Concerned about her daughter, Mrs McGrath attempted to make an appointment for her to see a general practitioner but was unable to secure one before the evening and so cleared work commitments for that day. She sought the advice of a friend who was a nurse and ultimately decided to take Ms McGrath to the hospital. However, when her daughter was in too much pain to negotiate the stairs, she called for an ambulance.
7. At about 11.20am, Ms McGrath arrived at the emergency department [ED] of Ballarat Base Hospital. She reported a 12-hour history of vomiting, diarrhoea, abdominal pain and fever. On examination, she had a temperature of 37.4 degrees Celsius, blood pressure of 105/62 mmHg<sup>1</sup> and a pulse rate of 86 beats per minute. Her temperature spiked to 38.4 degrees Celsius with further vomiting at 11.40am.
8. Multiple blood tests were performed at 1pm. Full blood examination revealed neutropenia,<sup>2</sup> thrombocytopenia<sup>3</sup> and an elevated c-reactive protein;<sup>4</sup> renal and hepatic dysfunction was also apparent. Blood cultures were also performed and these subsequently grew *Neisseria meningitidis*.
9. At 1.05pm, Ms McGrath's blood pressure dropped to 76/40mmHg but recovered somewhat to 85-105 systolic with fluid resuscitation.
10. At 1.15pm, Ms McGrath was moved to a resuscitation bay for further management. A rash described as petechial and non-blanching was noted to have developed on her face. Intravenous morphine was administered for pain along with saline and an anti-emetic, metoclopramine. At 1.30pm the antibiotic ceftriaxone was commenced and ED consultants and intensive care clinicians were involved in Ms McGrath's care.
11. At 2.25pm, Ms McGrath underwent CT scans of her head and abdomen. These demonstrated hypoperfusion complex (hypovolaemic shock)<sup>5</sup> affecting the major vessels, liver, spleen, adrenals and small bowel.
12. Upon her return to the ED, Ms McGrath was administered antibiotics piperacillin/tazobactam intravenously along with granulocyte colony stimulating factor [G-CSF].<sup>6</sup> An antihypotensive medication, aramine, was administered at 2.50pm, 3.10pm and 3.30pm along with antibiotics (meropenem and a further dose of ceftriaxone) and corticosteroids.

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<sup>1</sup> A normal blood pressure for someone of Ms McGrath's age is between 90 and 120 systolic/80 mmHg.

<sup>2</sup> Abnormally low level of neutrophils (white blood cells) which impairs the body's ability to fight infection.

<sup>3</sup> Decrease in the number of platelets in the blood which reduces the blood's ability to clot and so can produce bleeding problems.

<sup>4</sup> An inflammatory marker indicating infection.

<sup>5</sup> Profound hypotension.

<sup>6</sup> A growth factor that stimulates bone marrow to produce granulocytes and stem cells and release them into the bloodstream used as a treatment for neutropenia.

13. At 3.45pm, Ms McGrath was transferred from the ED to the intensive care unit [ICU] with a diagnosis of overwhelming leukopenic meningococcal sepsis with cardiovascular shock, acute kidney injury, liver failure and consumptive coagulopathy. Ms McGrath was intubated and ventilated in the ICU and a central venous catheter and an intra-arterial line [IAL] were inserted. She developed a haematoma related to the IAL on her right thigh which was effectively managed with pressure.
14. Infectious disease specialist reviewed Ms McGrath and recommended antibiotics meropenem 2g three times per day and vancomycin 1g twice a day. G-CSF and steroid administration were continued.
15. At 6pm, Ms McGrath's condition appeared to have responded positively to the ongoing noradrenalin vasopressin, hydrocortisone and fluid resuscitation. However, due to a reducing cardiac index and a poor ejection fraction confirmed by echocardiography, an adrenalin infusion was commenced. Significant crystalloid and albumin filling<sup>7</sup> occurred to which Ms McGrath was initially responsive. Meanwhile, coagulation factor support was also administered given evidence of gastrointestinal bleeding and the need for further invasive catheters for renal replacement. Haemoglobin was monitored and hypoglycaemia was treated.
16. Clinicians met with Ms McGrath's family to explain her very grave condition and the likelihood that she would not recover.
17. The relative stability of Ms McGrath's condition had reversed by 6.20pm when she became progressively acidotic despite provision of increasing vasopressor doses to meet her growing need for cardiovascular support. Clinicians decided to institute renal replacement therapy and replace haemoglobin, which had dropped to 8.4g/L.<sup>8</sup>
18. At 7.30pm, as the renal replacement catheter was being inserted, Ms McGrath went into cardiac arrest. The procedure was aborted and advanced life support commenced which produced a return of spontaneous circulation within five minutes.
19. Over the following 30 minutes, Ms McGrath's requirement for vasopressor and inotropes continued to increase. She developed critically low blood pressure and external cardiac compressions and full advanced life support measures were recommenced at 8pm. Efforts were made to correct any reversible causes of her cardiac arrest, including an urgent transfusion as her haemoglobin had dropped further to 3.4g/L along with fresh frozen plasma,

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<sup>7</sup> Therapies that increase plasma volume to support (low) blood pressure.

<sup>8</sup> This level is about half the normal haemoglobin value for adult females.

cryoprecipitate, platelets, tranexamic acid and novo 7 in case the thigh haematoma was a cause of the deterioration.<sup>9</sup>

20. Despite transfusion achieving a haemoglobin level of 9.5g/L, coagulation factor support, acid base and electrolyte support, spontaneous circulation did not return. Echocardiography performed at 8.27pm confirmed no cardiac contraction in response to any ventricular activity and so all attempts to revive Ms McGrath were ceased at 8.28pm on 3 May 2017 and she was pronounced dead.
21. Ms McGrath's death was reported to the coroner and at my request First Constable Mathew Albon of Ballarat Police compiled the brief of evidence on which this finding is largely based.
22. Forensic pathologist, Dr Michael Burke of the Victorian Institute of Forensic Medicine, reviewed the circumstances of the death as reported by police to the coroner, post-mortem computer assisted tomography [PMCT] scans of the whole body and performed an external examination. Among Dr Burke's anatomical findings were numerous petechial and large haemorrhages over the face and a fine petechial rash over the abdomen, and evidence of medical intervention.
23. Dr Burke noted that the Department of Health had been notified that the blood culture taken at Ballarat Base Hospital showed the presence of gram negative diplococci.
24. Dr Burke attributed Ms McGrath's death to meningococcal septicaemia without the need for an autopsy, noting that there was no evidence to suggest that the death was due to anything other than natural causes.
25. I find that Ms McGrath, late of Ayrbale Avenue, Lake Gardens, died on 3 May 2017 at Ballarat Base Hospital, Ballarat and that the cause of her death was meningococcal septicaemia.

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<sup>9</sup> A vascular surgeon was consulted and confirmed that the haematoma was not large enough to cause Ms McGrath's current deterioration.

## COMMENTS

Pursuant to section 67(3) of the *Coroners Act* 2008, I make the following comments connected to the death:

1. Emma McGrath's untimely death is a tragic loss for her family, friends and the Victorian community and it highlights the rapidity with which even otherwise healthy young people can succumb to the uncommon but potentially fatal meningococcal disease.
2. Meningococcal disease is caused by bacteria and may be communicated from person to person by regular, close, prolonged household and intimate contact.
3. There are different strains of meningococcal bacteria known by letters of the alphabet, including meningococcal A, B, C, W and Y. In recent years, the incidence of meningococcal W strain has increased across Europe, South America and Australia, with Victoria experiencing one case in 2013, four in 2014, 17 cases in 2015, 48 in 2016 and 73 cases in 2017.<sup>10</sup>
4. Invasive meningococcal disease occurs when meningococcal bacteria enter the blood stream causing septicaemia or meningitis. According to the Victorian Department of Health and Human Services, death can occur in up to 10 per cent of invasive meningococcal disease cases.<sup>11</sup>
5. International clinical literature suggests that atypical presentations are associated with meningococcal W disease, particularly among adolescents and while this hyper-virulent strain is rare, it leads rapidly to progressive, severe disease and high case fatality. Atypical presentations include a short history of gastro-intestinal symptoms (nausea, vomiting and diarrhoea) such as those suffered by Ms McGrath or pneumonia, septic arthritis, endocarditis and epiglottitis.<sup>12</sup> It is self-evident that atypical presentations have the potential to complicate or impede timely diagnosis and effective treatment.<sup>13</sup>

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<sup>10</sup> <https://www2.health.vic.gov.au/public-health/infectious-diseases/disease-information-advice/meningococcal-disease>.

<sup>11</sup> Ibid. In 10 per cent of cases meningococcal disease proves to be fatal with death occurring within 24-48 hours of diagnosis. Of those who survive the disease, 20 per cent of people are left with a permanent disability such as brain damage or the loss of fingers, toes or limbs.

<sup>12</sup> Campbell, H. et al. 'Presentation with gastrointestinal symptoms and high case fatality associated with group W meningococcal disease (MenW) in teenagers, England July 2015 to January 2016'. *Euro Surveill.* 2016; 21(12):pii=30175

<sup>13</sup> The Victorian Department of Health and Human Services advises as follows [<https://www2.health.vic.gov.au/public-health/infectious-diseases/disease-information-advice/meningococcal-disease>]:

In children and adults, consider a diagnosis of meningococcal disease if signs and symptoms include:

- fever, pallor, rigors, sweats
- headache, neck stiffness, photophobia, backache, cranial nerve palsy
- vomiting and/or nausea, and diarrhoea
- lethargy, drowsiness, irritability, confusion, agitation, seizures or altered conscious state

6. The surge in cases of meningococcal disease in Victoria, and the prevalence of meningococcal W in particular, prompted the Victorian Government to announce in February 2017 a free one-year school-based meningococcal ACWY vaccination program commencing in term two of the 2017 school year for Victorian adolescents aged 15 to 19 years.<sup>14</sup> The vaccine's effectiveness has been estimated at 80 to 85 per cent.<sup>15</sup>
7. The Victorian Government published an Information Sheet for immunisation providers to assist them to determine if the free vaccine was appropriate for their patients.<sup>16</sup>
8. Significantly, during the free vaccination program (18 April and 31 December 2017) if an eligible young person could not or did not receive the vaccine through the secondary school program, she or he could receive the vaccine from a general practitioner or the local council community immunisation service.<sup>17</sup>
9. I note that although eligible to receive the free meningococcal disease vaccine, it does not appear that Ms McGrath had been immunised.
10. The Victorian Government's free meningococcal disease vaccination program for adolescents is not available in 2018.

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- moaning, unintelligible speech
  - painful or swollen joints, myalgia or difficulty walking.

Although the absence of a rash does not exclude meningococcal disease, note in particular any haemorrhagic rash, particularly of a pinprick, petechial or purpuric appearance.

In infants and young children, the following may also occur:

- irritability, dislike of being handled
- tiredness, floppiness, drowsiness
- twitching or convulsions
- grunting or moaning
- turning from light.

For people of all ages, note any rapid deterioration in clinical condition.

<sup>14</sup> <https://www2.health.vic.gov.au/about/news-and-events/news/free-meningococcal-vaccination-program>.

<sup>15</sup> Free Meningococcal A, C, W, Y vaccine program in Victoria – Information for immunisation providers [<https://www2.health.vic.gov.au/.../%7B4C6FDE49-A86D-4862-AE00-FE5A1DEE3D...>]

<sup>16</sup> Ibid.

<sup>17</sup> Ibid. Other groups at particular risk of contracting meningococcal disease may also access the vaccine free of charge [<https://www2.health.vic.gov.au/searchresults?q=free%20meningococcal%20vaccination%20victoria%20&ps=10&pn=2&s=relevance&i=&f=&n=&e=&a=&ac=&df=&dt=&l=&lq=>

## RECOMMENDATION

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

1. That the Victorian Department of Health and Human Services consider reinstating access to free meningococcal ACWY vaccination for young people aged 15 to 19 years inclusive, whether in the secondary school setting or otherwise.
2. That the Royal Australian College of General Practitioners inform its members of the need to ensure that patients ages between 15 and 19 years (including those who turned 19 years in 2017) have received the meningococcal ACWY vaccine (if clinically appropriate) or are otherwise advised of the availability of the vaccine and the costs and benefits of immunisation against meningococcal disease.

In conclusion, I extend my sincere condolences to the family and friends of Emma McGrath.

Pursuant to section 72(1) I direct that this Finding be published.

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

Mr and Mrs McGrath

Dr Linda Danvers, Ballarat Health Services

Victorian Department of Health and Human Services

Royal Australian College of General Practitioners

FC M. Albon, Ballarat Police

Signature:



**PETER CHARLES WHITE**  
CORONER

Date:

15/1/2018.

