Capital & Coast District Health Board

A Report by the
Health and Disability Commissioner

(Case 17HDC00690)

Health and Disability Commissioner
Te Toihau Hauora, Hauātanga

Contents

Executive summary

1. Mrs A had a complex medical history including asthma, a thyroidectomy[1] owing to Graves' disease,[2] an aortic and mitral valve replacement in 2000, and chronic renal (kidney) failure. Mrs A presented to an Emergency Department at Hospital 1 with right-sided weakness in her face, arm, and leg. A CT scan showed a large left parietal intracerebral haematoma[3] with a midline shift.[4] Immediately following admission, Mrs A's Glasgow Coma Scale (GCS)[5] score was 15/15, but subsequently it dropped to 13/15, then to 6/15.

2. Mrs A was intubated and ventilated,[6] and transferred to Hospital 2, where she was admitted to the Intensive Care Unit.

3. A left-sided parietal[7] craniotomy[8] and drainage of the intracerebral haematoma was performed on 18 Month1[9].

4. On 21 Month1, Mrs A was discharged to the Neurosurgery Ward. Neurosurgeon Dr B saw Mrs A on 23 Month1. He decided that because of her previous heart valve replacements and risk of thromboembolic complications, she should recommence anti-coagulation. Although Dr B thought that treatment with intravenous heparin[10] was in Mrs A's best interests, he did not arrange for her family to be consulted about the decision.

5. Mrs A had regular aPTT testing.[11] The results were frequently high, and at those times staff followed the ICU heparin infusion protocol by stopping the heparin and restarting it at a lower rate. Advice was not sought from the Haematology team.

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[1] Removal of the thyroid gland.

[2] Graves' disease is an autoimmune disorder that causes hyperthyroidism (an overactive thyroid gland). The immune system attacks the thyroid and causes it to make more thyroid hormone than the body needs.

[3] An intracranial haematoma is a collection of blood within the skull, most commonly caused by rupture of a blood vessel within the brain or from trauma such as a car accident or fall. "Intracranial" bleeding refers to all bleeding that occurs within the skull, while "intracerebral" bleeding indicates bleeding within the brain parenchyma (the functional tissue).

[4] A midline shift of the brain develops when pressure on one side of the brain pushes it out of alignment.

[5] The Glasgow Coma Scale (GCS) is the most common scoring system used to describe the level of consciousness in a person following a traumatic brain injury. The GCS measures Eye Opening (E), Verbal Response (V), and Motor Response (M). Clinicians rate the best eye opening response, the best verbal response, and the best motor response an individual makes. The final GCS score is the sum of these numbers. The individual elements of a patient's GCS can be documented numerically as well as added together to give a total Coma Score (e.g., E2V4M6 = 12).

[6] Intubation is the insertion of a breathing tube into the trachea for mechanical ventilation of a patient who is not breathing adequately.

[7] The parietal lobe is near the top and centre of the cerebral cortex, just behind the frontal lobe and above the occipital and temporal lobes of the brain.

[8] A craniotomy is a surgical operation in which a bone flap is removed from the skull, to access the brain.

[9] Relevant months are referred to as Months 1-2 to protect privacy.

[10] Heparin is an anticoagulant. It is used to decrease the clotting ability of the blood and help to prevent harmful clots from forming in blood vessels.

[11] The Activated Partial Thromboplastin Clotting Time (aPTT) test measures the length of time (in seconds) that it takes for clotting to occur when reagents are added to plasma (the liquid portion of the blood). A

6. At approximately 1am on 28 Month1, Mrs A had a large vomit. RN H checked Mrs A's observations, and registrar Dr D responded to the request for an immediate review.

7. Dr D reviewed Mrs A at 1.30am. Her GCS had changed from 11/15 to 10/15, and she had a sluggish right pupil. He ordered an urgent brain CT scan, chest X-ray, and routine bloods. The CT scan reported worsening oedema around the initial intra-axial[12] haemorrhage, with new extra-axial haemorrhages in the midline and left frontal region, with associated mass effect.[13]

8. Dr D reassessed Mrs A, and her GCS remained unchanged. Dr D discussed the CT results with the on-call consultant, who advised Dr D that surgical intervention was not indicated at that point, but to continue to observe Mrs A. Mrs A was placed on hourly observations, and no further deterioration occurred. She was fasted so that she would be ready for surgery if required. Overnight, no Early Warning Score (EWS) was recorded for Mrs A.

9. On 28 Month1, Dr D handed over to the day team between 7.15am and 7.30am. A neurological examination update was provided, and the team reviewed the scans and discussed the cessation of the heparin and warfarin. Registrar Dr C interpreted Mrs A's neurological status (GCS 9/15 E1V2M6) as stable compared to her GCS in the early morning (E1–2V2M6). He continued to fast Mrs A in case of further deterioration.

10. RN E was caring for Mrs A, and the nursing care plan included assessment of her vital signs and rousability. RN E was told at handover that a review of Mrs A by the day doctors was imminent.

11. At 7.30am, RN E performed an initial set of neurological observations and a physical examination. Mrs A responded to pain, but RN E had difficulty ascertaining whether she was obeying commands purposefully.

12. RN E asked the doctors to review Mrs A. RN E was not present when they went to Mrs A's area at about 8am, but a note was left for him in the Round Book that he was to continue two-hourly neurological observations, and that Mrs A was to have no anticoagulant therapies.

13. Dr C assessed Mrs A at 9.05am and recorded that her GCS was then E1V2M6. Dr D had handed over that Mrs A's GCS was E1–2V2M6 overnight, and Dr C interpreted that Mrs A's motor score (M6) and overall GCS (9/15) were stable.

14. Following Dr C's record of his 9.05am review, there are no further nursing or medical notes until Dr B saw Mrs A at 1.00pm.

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normal range is around 25 to 35 seconds. The aPTT is used to monitor heparin anticoagulant therapy — too much and the patient will bleed excessively, too little and the patient may continue to clot.

[12] "Extra-axial" is a descriptive term to denote lesions that are external to the brain parenchyma, in contrast to "intra-axial", which describes lesions within the brain substance.

[13] A mass effect is the effect exerted by any mass, including, for example, an evolving intracerebral haemorrhage presenting with a clinically significant haematoma. The haematoma can exert a mass effect on the brain, increasing intracranial pressure and potentially causing a midline shift or brain herniation.

15. Dr C met with Dr B at around 10am, and conveyed that he had reviewed Mrs A and that she was neurologically stable.

16. Dr B said that Dr C told him that Mrs A had had a CT scan overnight, but it was a passing comment rather than part of a discussion about Mrs A's clinical state. Dr B enquired briefly as to Mrs A's clinical condition and the imaging findings, and was reassured that she was stable and that any imaging changes were not of any great significance. He did not pursue the conversation further, as he believed that Mrs A would be reviewed during the group ward round. Dr C said that the outcome of the discussion was that he and Dr B would review Mrs A after the morning multidisciplinary team (MDT) meeting. Dr C said that subsequently he did not receive any calls from the ward staff about Mrs A's condition.

17. Dr B did not participate in the group ward round because of the need to assess another patient. He assumed that Mrs A would be seen regardless of his absence, as was the standard practice. He told the staff that he would be available at around 1pm.

18. RN E stated that his ability to undertake Mrs A's observations was hampered by Mr A, who insisted that Mrs A was obeying commands and responding in ways that he (RN E) could not see. Mr A thought that Mrs A was experiencing pain, and said that RN E was hurting her, which made it difficult for RN E to assess her objectively.

19. RN E stated that during his shift he updated the Charge Nurse Manager (CNM) of the Neurosurgery Ward, RN I, and the Associate Charge Nurse Manager (ACNM), RN K, so that they were aware of Mrs A's ongoing condition. He said that at around 10.15am he found that Mrs A was less responsive, and when he advised RN I, she said that a review by the consultant was imminent.

20. At 10.20am, the Adult Vital Signs Chart shows a GCS of 8, with the right pupil dilated and non-reactive.

21. RN I said that some time after 9.45am she was in the communal nursing station with RN E, who spoke about an interaction he had had with Mr A. She does not recall RN E mentioning anything about Mrs A's clinical presentation.

22. RN I telephoned Dr B at 10.30am to see whether he would be attending the ward round, and spoke to him about the difficulties in providing nursing care to Mrs A because of her husband's actions. RN I does not recall being aware of Mrs A's clinical presentation at that time. RN I told Mr A that Dr B would come in after the ward round. She also told the doctors that she had called Dr B, who would be coming in to see Mrs A. The doctors did not review Mrs A on the ward round.

23. At 11.15am, the Adult Vital Signs Chart again shows a GCS of 8 with the right pupil dilated and non-reactive. Mrs A had no movement in either leg, and had developed a new weakness in her left arm.

24. RN I stated that she spoke to RN E again some time later, and he mentioned Mr A again, and said that there was some fluctuation in Mrs A's responsiveness. RN I said that she expected that RN E had already escalated any clinical concerns through the usual channels in the EWS process by informing the medical team and the shift co-ordinator if necessary.

25. RN E stated that he spoke to RN I to raise his concerns about Mrs A's deterioration, and also for advice on how to deal with Mr A's behaviour, as he was still finding it difficult to assess Mrs A because of Mr A's interruptions. RN E said that RN I told him that the consultant was coming to review Mrs A and talk to the family, which reassured him and addressed his concerns.

26. Dr C stated that at around 11am, RN I told him that there was no change in Mrs A's condition, and to avoid reviewing her as her husband was very angry about her care. Dr C stated that prior to Dr B's review of Mrs A, the registrars were unaware of any further clinical deterioration.

27. At 1.00pm, Dr B assessed Mrs A and found her GCS to be 7/15 (E1V1M5). An urgent CT scan performed 30 minutes later showed an increase in size of the subdural bleed, with further swelling and mass effect, and a midline shift.

28. Mrs A's coagulation status was reversed back to normal, and an urgent decompressive craniectomy[14] was performed.

Findings

29. The standard of communication within the department was very poor, and adversely affected the quality and continuity of services provided to Mrs A. Accordingly, Capital & Coast DHB was found to have breached Right 4(5) of the Code of Health and Disability Services Consumers' Rights (the Code).[15]

30. Information that should have initiated a timely response to Mrs A's deterioration was available within the system, but this did not occur. The Commissioner considered that the services provided to Mrs A were markedly sub-optimal, and accordingly that Capital & Coast DHB breached Right 4(1)[16] of the Code.

31. The clinical documentation of Mrs A's deteriorating neurological status and of communications with the family and with other members of the team was very poor, and contributed to the lack of continuity of care. Therefore, Capital & Coast DHB was found to have breached Right 4(2) of the Code.[17]

[14] A craniectomy procedure involves the removal of a bone flap that is not returned to its location after the procedure — either because of trauma to the bone itself, or because the brain is too swollen to permit the return of the bone flap.
[15] Right 4(5) states: "Every consumer has the right to co-operation among providers to ensure quality and continuity of services."
[16] Right 4(1) states: "Every consumer has the right to have services provided with reasonable care and skill."
[17] Right 4(2) states: "Every consumer has the right to have services provided that comply with legal, professional, ethical, and other relevant standards."

32. Adverse comment was made about Dr B's failure to take reasonable steps to consult with Mrs A's family and answer any questions they had before commencing heparin.

33. Adverse comment was made regarding a concerning lack of critical thinking by Capital & Coast DHB staff when Mrs A's response to the heparin infusion was outside the norm — rather than consult the Haematology team, staff continued to follow the protocol.

Recommendations

34. The Commissioner recommended that Capital & Coast DHB:

a) Report back to HDC on the implementation of the recommendations in its Serious Sentinel Event Report.

b) Provide training to clinical staff on communication pathways and record-keeping.

c) Audit the provision of anti-coagulation therapy in cases where the aPTT level has remained above normal for more than a 24-hour period, to ascertain whether advice was sought from the Haematology service.

d) Review the handover policy, particularly in relation to provision of information directly to consultants.

e) Review the EWS policy to determine whether to include the requirement for regular and consistent GCS and EWS scoring; the early reporting and documentation of changes in scores; clear documentation that the appropriate clinician has been informed of the changes; and that the frequency of observations must increase if abnormal physiology is detected.

f) Include in the EWS policy a requirement that if a patient deteriorates, nursing staff must inform the medical team as soon as possible. If no satisfactory plan is formulated or the patient continues to deteriorate, the nursing staff must re-escalate to the consultant in charge, and document the steps taken.

g) Develop an escalation process for situations in which clinical care is impeded by concerned relatives of patients.

h) Audit the clinical records of 50 patients whose EWS scores indicated that they were deteriorating, to ascertain whether the "Adult and paediatric vital sign measurement, early warning score and escalation" policy was complied with.

i) Provide a formal written apology to Mrs A.

Complaint and investigation

35. The Health and Disability Commissioner (HDC) received a complaint from Mr A about the services provided to his wife. The following issue was identified for investigation:

- *Whether Capital & Coast District Health Board provided Mrs A with an appropriate standard of care.*

36. The parties directly involved in the investigation were:

Mrs A	Consumer
Mr A	Complainant
Capital & Coast District Health Board (DHB)	Provider
Dr B	Provider/neurosurgeon
Dr C	Provider/registrar
Dr D	Provider/registrar
RN E	Provider/registered nurse
Dr F	Provider/registrar
RN G	Provider/registered nurse
RN H	Provider/registered nurse
RN I	Provider/registered nurse
Dr J	Provider/registrar

Also mentioned in this report:

RN K	Associate Charge Nurse Manager

37. Independent expert advice was obtained from a registered nurse, Vivienne Josephs (**Appendix A**), and a consultant neurosurgeon, Dr Peter Gan (**Appendix B**).

Information gathered during investigation

Background

38. Mrs A had a complex medical history including asthma, a thyroidectomy[18] owing to Graves' disease,[19] an aortic and mitral valve replacement in 2000, and chronic renal (kidney) failure.

39. Mrs A was taking thyroxine,[20] prednisolone,[21] salbutamol[22] and Symbicort[23] inhalers, and warfarin[24] daily.

[18] Removal of the thyroid gland.
[19] Graves' disease is an autoimmune disorder that causes hyperthyroidism (an overactive thyroid gland). The immune system attacks the thyroid and causes it to make more thyroid hormone than the body needs.
[20] Thyroxine is the main hormone secreted into the bloodstream by the thyroid gland.

Hospital 1

40. On 18 Month1, Mrs A presented to the Emergency Department (ED) at Hospital 1 with right-sided weakness in her face, arm, and leg. A CT scan of her head showed a large left parietal intracerebral haematoma [25] with a midline shift. [26] Immediately following admission, Mrs A's Glasgow Coma Scale (GCS)[27] score was 15/15, but subsequently it dropped to 13/15, then to 6/15.

Hospital 2 Intensive Care Unit

41. Mrs A was intubated and ventilated,[28] and transferred to Hospital 2. She was admitted to the Intensive Care Unit (ICU) under the care of a consultant neurosurgeon.

42. Neurosurgery registrar Dr F recorded that while Mrs A was in ICU, there was discussion with her family regarding the risks and benefits of surgery, including that if surgery were to be undertaken she would likely suffer from right-sided weakness and speech impairment. Dr F documented that the family wanted the surgery to proceed. A decision was made to perform a left-sided parietal[29] craniotomy[30] and drainage of the intracerebral haematoma. The operation was performed on 18 Month1.

43. On 20 Month1, Mrs A's GCS score was 10/15. She opened her eyes in response to verbal commands, and she was able to squeeze with her left hand, but she was unable to obey other simple commands such as to open her mouth, and she was unable to speak.

[21] A corticosteroid used to help control inflammatory and allergic conditions such as asthma, rheumatoid arthritis, and colitis.
[22] Salbutamol is a medication that opens up the medium and large airways in the lungs. It is used to treat asthma, exercise-induced bronchoconstriction, and chronic obstructive pulmonary disease (COPD).
[23] Used to treat asthma.
[24] Warfarin is an anticoagulant (blood thinner) medication. It is commonly used to treat blood clots such as deep vein thrombosis and pulmonary embolism, and to prevent stroke in people who have atrial fibrillation, valvular heart disease, or artificial heart valves.
[25] An intracranial haematoma is a collection of blood within the skull, most commonly caused by rupture of a blood vessel within the brain or from trauma such as a car accident or fall. "Intracranial" bleeding refers to all bleeding that occurs within the skull, while "intracerebral" bleeding indicates bleeding within the brain parenchyma.
[26] A midline shift of the brain develops when pressure on one side of the brain pushes it out of alignment.
[27] The Glasgow Coma Scale (GCS) is the most common scoring system used to describe the level of consciousness in a person following a traumatic brain injury. The GCS measures Eye Opening (E), Verbal Response (V), and Motor Response (M). Clinicians rate the best eye opening response, the best verbal response, and the best motor response an individual makes. The final GCS score is the sum of these numbers. The individual elements of a patient's GCS can be documented numerically as well as added together to give a total Coma Score (e.g., E2V4M6 = 12).
[28] Intubation is the insertion of a breathing tube into the trachea for mechanical ventilation of a patient who is not breathing adequately.
[29] The parietal lobe is near the top and centre of the cerebral cortex, just behind the frontal lobe and above the occipital and temporal lobes of the brain.
[30] A craniotomy is a surgical operation in which a bone flap is removed from the skull, to access the brain.

Neurosurgery Ward

44. On 21 Month1, Mrs A was discharged to the Neurosurgery Ward. The clinical discharge summary notes that she was not for warfarin at that stage, and that further discussion was required prior to restarting it.

45. Neurosurgeon Dr B stated that he first saw Mrs A on 23 Month1. He said that because Mrs A had previously had heart valve replacements and had a risk of thromboembolic complications, he felt that as it was nearly five days after her surgery, it would be reasonable for her to recommence anti-coagulation. He said that it was necessary to weigh the risk of re-bleeding with the risk of stroke, and that he tended to delay the decision to commence anti-coagulation for as long as he felt he comfortably could.

46. Dr B stated that there is little good science to guide decisions of that nature but, in the past, he would have recommenced warfarin at the patient's usual dose. However, it takes several days to achieve a therapeutic effect, and during that time patients are vulnerable to thrombi[31] forming on their heart valves, which can then embolise,[32] potentially causing a stroke. He stated that it is now thought advisable to initiate and maintain anti-coagulation with heparin[33] whilst the warfarin is achieving the necessary therapeutic level. He said that although heparin can precipitate bleeding, it is fast-acting and can be reversed rapidly should the patient suffer a further haemorrhage.

47. Dr B stated:

> "[T]he administration of intravenous heparin infusions are protocolised and provided that patients remain within defined therapeutic limits I have come to regard this as an acceptable treatment strategy."

48. With regard to consent to the administration of heparin, Dr B stated that Mrs A was markedly dysphasic[34] following her initial haemorrhage, and in no position to enter into any conversation regarding the risks and benefits of anti-coagulation. He said that he was not aware of anyone holding an enduring power of attorney for her, and so he felt it was his responsibility to act in her best interests. He said that he discussed her treatment with a member of his team, and instructed that intravenous heparin be commenced.

49. Mr A told HDC that he asked on several occasions why Mrs A needed heparin, and he was not told that his wife "had a choice in the matter".

50. Dr B does not recall whether Mrs A's family were present at the time of his review at 8.20am on 23 Month1; however, the clinical records state that family had stayed overnight on 22/23 Month1 and were present later that day. Dr B stated that although Mr A said

[31] A thrombus is a blood clot in the vascular system (circulatory system). It stays attached to the site where it forms and impedes blood flow.
[32] An embolism is a foreign substance or a blood clot that travels through the bloodstream, lodging in a blood vessel and obstructing the vessel.
[33] Heparin is an anticoagulant. It is used to decrease the clotting ability of the blood and help to prevent harmful clots from forming in blood vessels.
[34] Inability to speak or understand words.

that he enquired on several occasions as to why the heparin was required, he (Dr B) was not made aware of those concerns at the time, and does not know with whom the concerns were raised.

51. Dr B stated:

> "It is a matter of regret that [Mrs A] and her wider family were not involved in the decision to commence heparin as indeed she should have been offered choice in this matter. I did not instruct any member of my team to speak to her family about her treatment options or their relative risks and I consider that to be an oversight on my part. It would however have been my recommendation that she be treated with intravenous heparin as the alternative was to risk suffering a thromboembolic event such as a stroke, compounding her already significant neurological deficit … In my view the difficulties [Mrs A] experienced did not lie with the decision to start heparin but rather in its implementation. She was anticoagulated to a degree that far exceeded the intended level and as a consequence she suffered another intracranial haemorrhage."

52. On 23 Month1, Mrs A was started on a heparin infusion. The progress notes state that the infusion had been discussed with the Haematology Department. That morning, Mrs A's GCS was 11/15, and she was able to lift her arm off the bed. She still had right-sided weakness, but was able to smile and communicate.

Readmission to ICU

53. On 23 Month1 in the evening, Mrs A developed a cough and was struggling to swallow her saliva. She required frequent suctioning. In response to the provisional opinion, Mr A said that initially an ICU nurse and a doctor refused to readmit Mrs A to the ICU, but eventually she was readmitted for ongoing airway and breathing support.

54. Mrs A had regular aPTT testing.[35] On 24 Month1 at 3.30am, Mrs A's aPTT reading was 20 seconds. The heparin infusion was increased from 2.1mls/hour to 2.6mls/hour. At 7pm on 24 Month1, a nurse recorded in the progress notes that the aPTT result was 18 seconds and the heparin infusion had been titrated to 3.1mls/hour. The next aPTT test was due at 8.30pm, but the nurse recorded in the progress notes that she was not able to access a vein. The heparin infusion continued. On 25 Month1, the aPTT scores were 79 seconds and 97 seconds. The progress notes state: "Followed [heparin infusion] protocol with heparin therapy."

55. On 26 Month1 at 12.35am, a nurse recorded that the aPTT had come back as >180 seconds, and so the heparin infusion had been stopped for one hour, and the rate was decreased from 3.5mls/hour to 3.2mls/hour in accordance with the ICU heparin infusion

[35] The Activated Partial Thromboplastin Clotting Time (aPTT) test measures the length of time (in seconds) that it takes for clotting to occur when reagents are added to plasma (the liquid portion of the blood). A normal range is around 25 to 35 seconds. The aPTT is used to monitor heparin anticoagulant therapy — too much and the patient will bleed excessively, too little and the patient may continue to clot.

protocol. That day the aPTT result was high on three occasions. Each time heparin was stopped for an hour then restarted.

Return to Neurosurgery Ward

56. On 26 Month1, Mrs A was well enough to be discharged from the ICU to the Neurosurgery Ward. At 2pm, Mrs A's GCS score was 11/15. At around 3.40pm, the heparin infusion was restarted at 2.6mls/hour. When retested around 11pm, the aPTT was 131 seconds, and so the heparin infusion was stopped and restarted an hour later.

57. Mrs A's vital signs were recorded regularly on 26 Month1, but her Early Warning Score (EWS)[36] was not calculated consistently.

58. On 27 Month1, warfarin was commenced. At 10.40pm, Mrs A's aPTT readings were >180 seconds. Registrar Dr D said that the on-call house officer spoke to him about Mrs A's high aPTT level. Dr D stated: "I advised to follow all steps on hospital protocol guidelines, which included stopping the heparin infusion. The House Officer completed this prior to my review at 01:30am."

28 Month1

59. At approximately 1am on 28 Month1, Mrs A had a large vomit. RN H stated that she immediately stopped Mrs A's nasogastric feeding and rang the emergency bell. In response to the provisional opinion, Mr A said that he was present and he called for help and rang the bell. RN H said that one of the nurses who responded rang the house officer and the registrar to ask for an immediate review, and another gave Mrs A an anti-emetic (a medication to prevent vomiting). RN H stated that she checked Mrs A's observations, and Dr D responded to the request for an immediate review.

60. Dr D stated that he was aware that Mrs A had undergone the evacuation of an intracranial haematoma on 18 Month1 and was being treated with anti-coagulation because of having had a heart valve replacement.

61. Dr D said that when he reviewed Mrs A at 1.30am, her GCS had changed from 11/15 to 10/15, and she had a sluggish right pupil. He ordered an urgent brain CT scan, chest X-ray, and routine bloods. The CT scan was performed at 2.12am. The report at 3.19am records an impression that Mrs A had worsening oedema around the initial intra-axial[37] haemorrhage, with new extra-axial haemorrhages in the midline and left frontal region, with associated mass effect.[38]

[36] An Early Warning Score is a tool used to assist staff with the recognition and appropriate response to a patient who is deteriorating clinically, or is at risk of clinical deterioration. An EWS is calculated from routine vital sign measurements, including respiration rate, presence/absence of oxygen therapy, oxygen saturation, heart rate, blood pressure, level of consciousness, and temperature.

[37] "Extra-axial" is a descriptive term to denote lesions that are external to the brain parenchyma, in contrast to "intra-axial", which describes lesions within the brain substance.

[38] A mass effect is the effect exerted by any mass, including, for example, an evolving intracerebral haemorrhage presenting with a clinically significant haematoma. The haematoma can exert a mass effect on the brain, increasing intracranial pressure and potentially causing midline shift or brain herniation.

62. Dr D stated that he then reassessed Mrs A, and her GCS remained unchanged.

63. Dr D said that he spoke to the on-call consultant at 3.36am to discuss the CT results. Dr D stated that he relayed the background history, including Mrs A's heparin treatment and the events of that night, in detail. Dr D said that the consultant advised him that surgical intervention was not indicated at that point, and to continue to observe Mrs A. The consultant advised Dr D to contact him if there was any further deterioration.

64. Dr D said that the plan was for ongoing neurological observations, and added:

> "I recall checking with the nurse in charge several times overnight to ensure that the GCS and neurological examination findings were stable. I was informed that they were unchanged. I received no further calls during the shift from nursing staff to indicate that there was any deterioration in neurological status."

65. Dr D stated that following his discussion with the consultant, Mrs A was observed hourly, and there was no deterioration. Dr D said that the close monitoring was deliberate and more regular than the normal four-hour interval monitoring. He said that Mrs A was fasted from the time of her vomit, so that if surgery was required she would be ready.

66. Overnight, an EWS was not recorded for Mrs A.

Morning shift 28 Month1

Handover meeting

67. Dr D stated that he handed over to the day team on 28 Month1 between 7.15am and 7.30am. He said that the events overnight were discussed and handed over in detail, including the CT scan findings. He said that a neurological examination update was provided, and the team reviewed the scans and discussed the cessation of the heparin and warfarin. Dr D's shift then finished.

68. Registrar Dr C stated that Dr D handed over that Mrs A was not for any neurosurgical intervention unless there was further deterioration. Dr C said that he interpreted Mrs A's neurological status (GCS 9/15 E1V2M6) as stable compared to her GCS in the early morning (E1–2V2M6). Dr C stated that he continued to fast Mrs A in case of further deterioration.

RN E

69. RN E worked a morning shift on 28 Month1. He stated that at the beginning of the shift the night nurse handed over that Mrs A's condition had deteriorated and an urgent scan had been conducted, and that her pupils were not a reliable sign of her condition because she had glaucoma. In response to the provisional opinion, Mr A said that Mrs A did not have glaucoma at that time, and it was not diagnosed until later.

70. RN E said that the plan was for nursing staff to assess Mrs A's clinical picture by way of her vital signs and rousability. He said that he was advised that Mrs A was to have an imminent review by the day doctors.

71. RN E stated that at 7.30am he performed an initial set of neurological observations and a physical examination. Mrs A responded to pain, but he had difficulty in ascertaining whether she was obeying commands purposefully as she had done previously. He stated that this was a drop in her GCS, as until 5.30am she had been reported as obeying commands.

72. RN E stated:

> "Given the difficulty in ascertaining [Mrs A's] GCS, I went and asked the team of doctors, who were currently meeting in the fishbowl, if they could review [Mrs A] before going to their radiology meeting as they knew her previously."

73. RN E said that he was not present when the doctors went to Mrs A's area at about 8am, but a note was left for him in the Round Book that he was to continue two-hourly neurological observations, and ensure that Mrs A had no anticoagulant therapies. RN E stated: "I therefore thought that the doctors had seen [Mrs A]. I subsequently learnt that they had not."

Medical review

74. Registrar Dr F said he recalls that the neurosurgical team reviewed Mrs A's CT scan in the morning and felt that the scan had concerning features. He said that his colleagues planned to review Mrs A prior to attending the morning multidisciplinary team (MDT) meeting and discuss her case with Dr B.

75. Dr J stated that she was working as a relief registrar between the Cardiothoracic Unit and the neurological teams. On 28 Month1, she was working the day shift for the neurosurgical team. After handover, she attended a departmental teaching session with the consultants. She stated: "I do not recall [RN E] requesting a review for [Mrs A] at this time (ie, roughly 9.00am)."

76. Dr C stated that following handover he was asked by the neurosurgical team to review Mrs A, as the other team members were to attend the MDT meeting. He assessed Mrs A at 9.05am and recorded that she had been drowsy overnight, and her GCS at that time was E1V2M6. Dr C stated that Dr D had handed over that Mrs A's GCS was E1–2V2M6, and he interpreted that Mrs A's motor score (M6) and overall GCS (9/15) were stable.

77. Following Dr C's record at 9.05am, there are no further clinical nursing or medical notes until Dr B saw Mrs A at 1.00pm.

78. Dr C said that he tried to contact Dr B at around 9.30am after he had reviewed Mrs A, but Dr B was presenting a case at the MDT meeting. Dr C said that he met with Dr B at around 10am and conveyed that he had reviewed Mrs A and that she was neurologically stable at that time. Dr C added:

> "Probably this was not well communicated to [Dr B] by me during [the MDT meeting] on that day leaving [Dr B] to believe that [Mrs A's] GCS [was] stable compared to a day prior when she was E4V2M6."

79. Dr B stated that normally the MDT meeting would continue until 11.00am, after which the entire neurosurgical team would conduct a ward round to review all patients on the service. With regard to the above conversation, Dr B said that at around 10.30am Dr C told him that Mrs A had had a CT scan overnight. Dr B stated that in the context of the MDT meeting, it was a passing comment rather than part of a discussion about Mrs A's clinical state. Dr B said that he expressed surprise that Mrs A had been imaged, as normally a CT scan would be conducted only if there had been clinical deterioration, and he had not been informed of such.

80. Dr B said that he enquired briefly as to Mrs A's clinical condition and the imaging findings, and was reassured that she was stable and that any imaging changes were not of any great significance. He said that he did not pursue the conversation further at that time, as he believed that Mrs A would be reviewed in the near future on the group ward round. Dr C said that the outcome of the discussion was that he and Dr B would review Mrs A after the MDT meeting. Dr C said that subsequently he did not receive any calls from the ward staff about Mrs A's condition.

81. Dr B added:

> "Unusually that morning another patient's clinical problem came to my attention and in order to remedy that I elected not to participate in the group ward round. I assumed that [Mrs A] would be seen regardless of my absence as that is our standard practice. I was aware that [Mrs A's] family had raised concerns regarding elements of her nursing care and I had been asked by a member of the senior nursing team to meet with the family to discuss these in greater detail. I let it be known that I would be free to have that conversation at around 1300 hours, shortly before I was due to start my afternoon outpatient clinic."

Deterioration

82. RN I stated that at the time of these events she was Charge Nurse Manager (CNM) in the neurosurgical ward. She stated that as CNM she would not have provided nursing care to Mrs A, but was aware of her clinical background from daily visits to the ICU, handovers, and discussions with medical staff. RN I stated that on 28 Month1, the shift was co-ordinated by Associate Charge Nurse Manager RN K. RN I stated that she was present for handover, following which she attended a management meeting at 9.15am, and would have been back on the ward at approximately 9.45am.

83. RN E stated that undertaking Mrs A's observations was hampered by Mr A, who insisted that Mrs A was obeying and responding in ways that he (RN E) could not see. RN E said that Mr A stated that he thought Mrs A was experiencing pain, and said that RN E was hurting her, which made it difficult to assess her objectively.

84. RN E stated that during his shift he updated RN I and RN K, so that they were aware of Mrs A's ongoing condition. He said that at around 10.15am he found that Mrs A was less responsive and, when he advised RN I of that, he was told that a review by the consultant was imminent.

85. At 10.20am, the Adult Vital Signs Chart shows a GCS of 8, with the right pupil dilated and non-reactive.

86. RN I said that some time after 9.45am she was in the communal nursing station with RN E. RN I stated that RN E presented as "unusually distressed", and spoke about an interaction he had had with Mr A. RN E said that he felt that Mr A's involvement was creating a difficulty for him in undertaking Mrs A's nursing cares. RN I stated:

> "On this occasion [RN E] was expressing his frustration and some emotion about [Mr A's] behaviour and my concern was assisting [RN E] to alleviate his stress. I don't recall [RN E] mentioning anything about [Mrs A's] clinical presentation at this time."

87. RN I said that she telephoned Dr B at 10.30am to see whether he would be attending the ward round, and spoke to him about the difficulties in providing nursing care to Mrs A because of her husband's actions. RN I stated:

> "I did not discuss her clinical presentation and do not recall being aware of any particular clinical information except what I had heard at handover at that point. [Dr B] was not intending to attend the round but said he would come and see [Mrs A]."

88. RN I stated that she does not recall being aware of Mrs A's clinical presentation when she spoke to Dr B at 10.30am. She said that her call to Dr B was solely to discuss the difficulties staff had experienced in caring for Mrs A because of Mr A's involvement. RN I said that she spoke to Mr A and told him that Dr B would come in after the ward round. She said that as she left Mrs A's room she saw Dr C and other registrars approaching, and mentioned that she had called Dr B, who would be coming in to see Mrs A. RN I stated: "I anticipated that the medical team would see [Mrs A] as part of the ward round." In response to the provisional opinion, Mr A said that RN I entered and left with the doctors. He stated that the doctors reviewed the patient next to his wife, but did not review his wife. He said that he asked RN I why, and she replied that Dr B would see them in an hour's time. He said that RN I then left behind the doctors.

89. At 11.15am, the Adult Vital Signs Chart again shows a GCS of 8 with the right pupil dilated and non-reactive. Mrs A had no movement in either leg, and she had developed a new weakness in her left arm.

90. RN I stated that some time later she spoke to RN E again, and again he expressed the "discontent and stress" he was experiencing from dealing with Mr A. RN I said that during the conversation, RN E mentioned that there was some fluctuation in Mrs A's responsiveness. RN I said that she did not take this to be the purpose of the conversation, and expected that RN E had already escalated any clinical concerns through the usual channels in the EWS process by informing the medical team and the shift co-ordinator if necessary.

91. RN E stated that he spoke to RN I to raise his concerns about Mrs A's deterioration, and about how to deal with Mr A's behaviour, as he was still having difficulty assessing Mrs A because of Mr A's interruptions.

92. RN E said that RN I told him that the consultant was coming to review Mrs A and talk to the family, which reassured him and addressed his concerns.

Ward round

93. RN E stated:

> "I also mentioned to the doctors when they came to the ward (from a radiology meeting) at around 11.00am, that [Mrs A] was not obeying but [vocalising] at times and responding to touch by moving slightly … I expected, as a result of my discussion with them, that the doctors would go and see [Mrs A]."

94. RN E said that he went to see his other patients while the doctors moved through the ward, following which there were no new orders in the Round Book.

95. Dr J stated:

> "At around 11.00am, I was part of a consultant ward round (with [three others]). I do not recall being told about [Mrs A's] further deterioration at 11.00am by [RN E]. As [Dr B] (Consultant) was not present on the ward round, [Mrs A] was not seen at that time."

96. Dr C stated that during the ward round at around 11am, RN I told him that there was no change in Mrs A's condition, and to avoid reviewing her as her husband was very angry about her care. RN I said that she had informed Dr B, who would speak to Mr A. Dr C stated that the registrars were not told about further clinical deterioration prior to Dr B reviewing Mrs A.

Subsequent events

97. At 1.00pm on 28 Month1, Dr B assessed Mrs A. At that time, her GCS was 7/15 (E1V1M5). An urgent CT scan of her head was performed 30 minutes later, which showed an increase in size of the subdural bleed with more swelling and mass effect, and midline shift.

98. Mrs A's coagulation status was reversed back to normal, and she was taken to theatre urgently and underwent a decompressive craniectomy.[39] Following the surgery she was readmitted to the ICU.

99. Mrs A was extubated on 31 Month1. Her GCS was fluctuating between 7/15 and 10/15. On 3 Month2, her treatment was discussed with a cardiothoracic surgeon and it was decided to avoid heparin and to start warfarin slowly, aiming for an INR[40] between 2–2.5.

[39] A craniectomy procedure involves the removal of a bone flap that is not returned to its location after the procedure is finished — either because of trauma to the bone itself, or because the brain is too swollen to permit the return of the bone flap.

[40] "INR" stands for "International Normalised Ratio", and is a standardised measurement of the time it takes for blood to clot. The INR test result is given as a number, which is a ratio of the time it takes to clot the blood to the time of a normal sample of blood. A result of 1.0 to 1.5 is normal.

100. Mrs A was discharged to the Neurosurgery Ward on 6 Month2, at which stage her GCS was 11/15 (E4V1M6). Her warfarin was restarted on 10 Month2.

101. On 26 Month2, Mrs A was discharged to Hospital 1 for continuing rehabilitation. At discharge, her GCS was 11–12/15, with a dense right-sided weakness. Mrs A now has significant disabilities, including with her speech.

Further information — RN E

102. RN E stated that on 28 Month1 he wrote his nursing notes for the clinical record at 3.20pm, at the end of the shift. He said that he could not write his notes directly into Mrs A's file as it was with her in the operating theatre, so he wrote the notes on a progress notes sheet, which later was reunited with the main bulk of the file. He said that he also wrote some personal notes two days later. The notes do not refer to RN E having escalated his concerns about Mrs A during the shift.

103. RN E stated that he did not complete an incident report with regard to Mr A's behaviour because the CNM had said that the senior nursing team were addressing the issues with Mr A.

Policy: "Intravenous Unfractionated Heparin Treatment"

104. The "Intravenous Unfractionated Heparin Treatment" policy in place at the time states that the decision to start intravenous unfractionated heparin should be discussed with a consultant. The policy states that a baseline aPTT test must be performed, resulting in aPTT test ranges between 24–32 seconds. There should be consultation with the on-call haematologist if the patient has abnormal baseline tests.

105. The dosing protocol is set out in the IV Heparin chart (adult), which sets out the actions to be taken if the aPTT is outside the therapeutic range. It provides that if the aPTT is between 91–100, the infusion should be stopped for 30 minutes and the rate reduced. If the aPTT is between 101–150, the infusion should be stopped for 60 minutes and the rate of the infusion reduced further.

Policy: "Adult and paediatric vital sign measurement, early warning score and escalation"

106. The "Adult and paediatric vital sign measurement, early warning score and escalation" policy provides for the measurement of in-patient vital signs, calculation of the EWS, and use of the escalation pathway in order to detect patients who are deteriorating. The mandatory escalation pathway set out in the vital signs chart provides a tiered response protocol for nursing staff to follow.

107. Capital & Coast DHB said that staff are expected to use their clinical judgement regarding the interpretation and frequency of vital signs. It said that an EWS must be calculated for every set of vital signs measured.

Capital & Coast DHB Serious Sentinel Event Report

108. The Serious Sentinel Event Report (the report) found that the use of intravenous heparin as a temporary overlapping strategy prior to recommencement of the usual anti-coagulant warfarin is standard practice in patients with a high risk of thrombosis and bleeding.

109. The report notes that although neither Mrs A nor her family were consulted about the commencement of heparin, she knew that anticoagulation was necessary and, although discussion with the family as to the risks and benefits would have been ideal, it "would not have altered the absolute necessity to [commence heparin]".

110. The report states that Mrs A was over-coagulated on standard dosing, and notes that complying with the "Intravenous Unfractionated Heparin Treatment" protocol possibly resulted in a false sense of security that the procedure was safe in all circumstances. The report notes that the protocol does not ask medical staff to assess the patient's sensitivity to heparin once it has been started. It states that the problem of a persistently high aPTT despite reducing doses of heparin is very unusual and, as a result of these events, a new line had been added to the ICU algorithm, "if APTT ≥ 180 then stop infusion and notify a doctor".

111. With regard to the events on 28 Month1, the report states that there were three critical aspects not identified that would have prompted a different plan of care:

1. The CT findings from the night shift were not discussed with Dr B directly.
2. Lack of recognition that Mrs A's GCS had reduced from 12 the previous day to 9, and that overnight on 27/28 Month1 her GCS was fluctuating and she had anisocoria.[41]
3. Mrs A deteriorated acutely between 9.30 and 10am when her lower limbs were not responding to painful stimulus and her right pupil changed from sluggish to unreactive. Later that morning at 11.15am she deteriorated again. There was dependence on a pending review by Dr B, which may have created an unnecessary delay of one to three hours.

112. The report made the following recommendations:

- Review the anti-coagulation policy specifically for complex patients who have life-long anti-coagulation needs along with an acute illness or injury.
- Review the education provided at orientation and to current RMOs of the need for timely handover of clinical information to the responsible consultant.
- Update the Early Warning Score policy to reflect that in the case of ongoing deterioration re-escalation needs to occur.
- Present this case to emphasise the expectation for nurses to escalate concerns when further deterioration occurs despite plans for a pending review.

[41] Inequality in size of pupils.

113. Subsequently, Capital & Coast DHB made the following changes:

- It increased the nursing staffing in the neurosurgical ward by 8.14FTE (full-time equivalent).
- It established a high dependency unit within the neurosurgical ward.
- It introduced an additional daily meeting at 4.00pm between ACNMs and registrars to discuss concerns and review new patient transfers from ICU.
- It undertook an Improvement Methodology project to review and improve the process for patients transferring from ICU to the neurosurgical ward.
- It reviewed the "Systemic heparinisation of adults in the ICU" policy.
- It amended the IV unfractionated heparin chart to require intervention if a patient's aPTT is high for long periods.

Responses to provisional opinion

Mr A

114. Mr A's responses have been incorporated into the facts gathered as appropriate. In addition, he stated:

- On 18 Month1, Mrs A's CT scans were sent to Hospital 2, and he and Mrs A's son were told that there was nothing Hospital 2 could do for her and the best decision was to let her die in Hospital 1. He discussed the decision with Mrs A's brother, and they decided that she should be given a chance.
- The transfer by plane to Hospital 2 took four to five hours, and there appeared to be a lack of urgency.
- At 7.45pm on 21 Month1, Mrs A vomited, and as there were no nurses present she would have choked had he and Mrs A's son not been present, as Mrs A was not lying at the required 45 degree angle. An ICU nurse attended but she elected not to readmit Mrs A to the ICU at that time.
- Regarding the administration of heparin, he "repeatedly explained to the doctors that [Mrs A] had been in [Hospital 2] the year before for a kidney biopsy and clexane had been used successfully and asked why heparin was needed". He got no answer other than an explanation of what heparin did. The family were not offered choices in the matter and were not listened to. He considers that his wife should not have been administered heparin while she was being administered prednisolone, owing to a recurrence of her kidney disease.
- On 26 Month1, his wife had begun to improve, but when attempts were made to take blood from her, she bled, and the nurse had to return three times to treat the bleeding.
- On 28 Month1, his wife was behaving differently by continually placing her hand up to her head. He began logging his observations and he showed the log to RN E and RN K, and told them that something was wrong.

- For six hours he was watching his wife slowly die while no one listened to him or helped her. His only regret is that he did not take more steps, as then his wife may have been treated appropriately.

Capital & Coast DHB

115. Capital & Coast DHB stated that these events were influenced by the pressures being experienced by the whole team at that time, including high acuity and a significant level of violence from patients and family members towards staff. In response to the high acuity, it has established a High Dependency Unit.

116. Capital & Coast DHB accepted that there were failings in communication, and that there was a collective responsibility for the failings.

117. Capital & Coast DHB said that RN E had understood that his concerns about Mrs A's condition had been elevated, but he now realises that he should have checked that his concerns and observations were understood and well documented.

118. Capital & Coast DHB stated that the Associate Director of Nursing has prepared a support plan for RN E outlining his supervision and training expectations. His training will include "Speaking up for Safety" and focus on his communication and documentation.

119. Capital & Coast DHB acknowledged Mr A's concerns about his wife's care, and accepted the recommendations in the provisional report.

Opinion: Capital & Coast DHB — breach

Introduction

120. As I have emphasised in previous cases, DHBs are responsible for the operation of the clinical services they provide, including any service failures.[42] It is incumbent on all DHBs to support their staff with systems that guide and support good decision-making and promote a culture of safety.

121. It is also essential that staff think critically and recognise if a patient's response indicates that adherence to a protocol is inappropriate. In addition, teams need to communicate well, and ensure that concerns are escalated appropriately. I consider that the care provided to Mrs A by staff at Capital & Coast DHB was sub-optimal, as discussed below.

Standard of communication within Neurology department

122. At 1.30am on 28 Month1, Mrs A vomited, her GCS dropped from 11/15 to 10/15, and she had a sluggish right pupil. A CT scan showed subdural bleeding and a mid-line shift. Dr D spoke to the consultant on call, and it was decided to observe Mrs A overnight. Mrs A was fasted in case surgery was required.

[42] Opinion 14HDC01187 (30 June 2016). See also Opinion 16HDC01010 (12 March 2018).

123. My expert advisor, neurosurgeon Dr Peter Gan, advised that the decision not to proceed to surgery at that time was understandable because Mrs A's GCS was maintained at 10/15; however, he noted that the decision not to operate during the night should not be taken to mean that Mrs A was not to have an operation at all. He stated that the correct decision was to fast Mrs A and observe her until the morning ward round, so long as she remained stable.

124. Dr D handed over to the day team in detail regarding the events that had occurred overnight. He said that Mrs A was not to have any surgical intervention unless there was further deterioration, and that her neurological status was stable compared to her condition in the early morning. However, Dr D did not discuss Mrs A's condition with the responsible consultant, Dr B.

125. RN E was allocated the care of Mrs A on 28 Month1. He stated that he was told at handover that the plan was for the nursing staff to assess Mrs A's vital signs and rousability, and that she was to be reviewed by the day doctors.

126. At 7.30am, RN E noted that Mrs A was no longer obeying commands purposefully, and so he asked the doctors to review Mrs A before they went to their meeting. At 9.05am, Dr C reviewed Mrs A, at which time her GCS was 9/15. He interpreted that Mrs A's GCS was stable, in comparison with her GCS during the night.

127. At around 10.30am, Dr C told Dr B that Mrs A had undergone a CT scan overnight. Dr B stated that it was a passing comment rather than part of a discussion about Mrs A's clinical state. Dr B enquired briefly as to Mrs A's clinical condition and the imaging findings, and was reassured when Dr C told him that she was stable and that any imaging changes were not of any great significance. Dr B did not pursue the conversation further at that time, as he believed that Mrs A would be reviewed in the near future on the group ward round.

128. When Dr C told Dr B that Mrs A was neurologically stable, he did not clarify that he was comparing her condition then to her condition overnight, rather than her condition on the previous day, when her GCS was 12/15. This conversation was a lost opportunity to identify Mrs A's worsening condition.

129. As it turned out, Dr B was required to attend to another patient, and did not participate in the group ward round. He assumed that Mrs A would be seen regardless of his absence, as that was the standard practice.

130. Dr Gan stated that the consultant in charge should have been informed "relatively urgently" of the results of Mrs A's CT head scan and her condition, so that the consultant could make a decision about her management. I am critical of the communication failures that led to Dr B not being adequately informed. Dr D did not communicate directly with Dr B, and Dr C was unclear in the information he provided. In my view, it was essential that Dr B was made aware of Mrs A's deterioration from her condition the previous day.

131. Mrs A deteriorated further during the morning shift. At 10.20am and 11.15am, RN E recorded on the observation chart that Mrs A had a GCS of 8, with her right pupil dilated

and not reactive. RN E stated that when he found that Mrs A was less responsive at around 10.15am, he advised RN I, and she told him that a review by the consultant was imminent. In contrast, RN I stated that RN E was expressing his concerns about Mr A's behaviour, and she does not recall him mentioning anything at all about Mrs A's clinical presentation at that time. Consequently, when RN I contacted Dr B at 10.30am, she did not discuss Mrs A's clinical presentation, as she was not aware of it.

132. RN E also stated that he told the doctors when they returned to the ward at around 11am that Mrs A was not obeying commands but was vocalising at times and responding to touch by moving slightly. However, neither Dr J nor Dr C recall that RN E told them that Mrs A had deteriorated.

133. Ultimately, Mrs A was not reviewed on the ward round. Dr C said that RN I told him that there was no change in Mrs A's condition, and to avoid reviewing her as her husband was very angry about her care. Dr C stated that the doctors were not told about Mrs A's clinical deterioration. Again there was a failure of communication that resulted in Mrs A not being reviewed.

134. Later in the morning, RN E mentioned to RN I that there was some fluctuation in Mrs A's responsiveness. RN I said that she did not take this to be the purpose of the conversation, and expected that RN E had already escalated any clinical concerns through the usual channels in the EWS process by informing the medical team and the shift co-ordinator if necessary.

135. Capital & Coast DHB stated in its Serious Sentinel Event Report that there were subtle, yet clear, neurological signs that indicated that deterioration was occurring. The DHB stated that dependence on a pending review by Dr B may have created an unnecessary delay in Mrs A's review of one to three hours.

136. Dr Gan noted that Mrs A was seen during the morning round, but he considers it unacceptable that Dr B was not informed about her condition accurately, and that therefore he did not see her until 1pm. Dr Gan advised that the standard of care if a patient continues to deteriorate is that the medical staff, especially the consultant, should be informed as soon as possible, and surgery to release the pressure in the head and reduce intracranial swelling should be performed as soon as practically possible. He stated that there was a moderate deviation from the standard of care, which resulted in Mrs A's emergency surgery being delayed.

137. My nursing advisor, RN Vivienne Josephs, advised that it would have been appropriate for RN E to notify RN I of Mrs A's deteriorating condition, as it can be difficult for nursing staff to locate medical colleagues on an acute ward to convey concerns. RN I recalls that RN E mentioned that there was some fluctuation in Mrs A's responsiveness, and she expected that he had escalated that by informing the medical team and the shift co-ordinator if necessary.

138. There are also conflicting accounts of the information RN E provided to the medical team. I note that neither the registrars nor the Clinical Nurse Manager recall that RN E explicitly reported Mrs A's deterioration to them. RN E did not refer in the clinical records to his having conveyed information about Mrs A's deterioration to the registrars or nurses. In the circumstances, there is doubt as to whether he did so.

139. RN Josephs stated that there is evidence of significant miscommunication between the healthcare team looking after Mrs A. I consider there to have been a serious nursing communication failure. Furthermore, it appears that the lack of action was to some extent related to the belief that Dr B's review of Mrs A was imminent. However, in the event, he was delayed by the demands of another patient, and did not see Mrs A until 1.00pm, by which stage her GCS was 7/15.

Conclusions

140. Overall, I consider that the standard of communication within the department was very poor, and adversely affected the quality and continuity of services provided to Mrs A. Accordingly, I find that Capital & Coast DHB breached Right 4(5) of the Code.

141. The system had the information it needed to respond effectively to Mrs A's deterioration, but it failed to do so. As a consequence, the services provided to her were markedly sub-optimal. I find that Capital & Coast DHB failed to provide services to Mrs A with reasonable care and skill and breached Right 4(1) of the Code.

Record-keeping

142. RN Josephs noted that there was a lack of consistent documentation of the EWS from 26–28 Month1, and no documentation of the EWS over the night of 27/28 Month1.

143. At 7.30am on 28 Month1, RN E noted that Mrs A was no longer able to obey commands. He made entries on the observation chart but recorded nothing further contemporaneously in the progress notes.

144. Dr C reviewed Mrs A at 9.05am and recorded that she had been drowsy overnight and her GCS was E1V2M6. Nothing further is recorded in the progress notes until Dr B's review at 1.00pm. RN E said that he asked the doctors to review Mrs A before they went to their meeting. When a note was left for him in the Round Book that he was to continue two-hourly neurological observations, he assumed that the doctors had seen Mrs A.

145. RN Josephs advised that the documentation in the clinical notes of Mrs A's deteriorating neurological status and of communications with the family and other members of the team was very poor. RN Josephs noted that there was no documentation of escalation or increased concerns about Mrs A's condition having been conveyed to members of the medical/nursing teams at any time between 9.05am and 1.00pm. RN Josephs stated that the lack of documentation was a significant factor in the delayed response to Mrs A's clinical deterioration. Dr Gan was also critical of the lack of documentation between 9.05am and 1.00pm.

146. This Office has continually stressed the importance of clear and accurate documentation. As set out in the Health and Disability Services (Core) Standards, consumer information must be accurately recorded, current, and accessible when required. In my view, the documentation in this case was sub-optimal. The poor documentation contributed to the poor communication within the clinical team and the lack of continuity of care. Accordingly, I find that Capital & Coast DHB breached Right 4(2) of the Code.

Other issues — adverse comments

Consent to administration of heparin

147. Dr B first saw Mrs A on 23 Month1 and, at that stage, he considered that it was reasonable for her to recommence anti-coagulation. The intention was to utilise heparin while the warfarin was achieving the necessary therapeutic levels.

148. Dr B stated that Mrs A was not able to discuss the risks and benefits of anti-coagulation, and so he felt that it was his responsibility to act in her best interests. He stated that intravenous heparin was in her best interests because the alternative was to risk a thromboembolic event such as a stroke.

149. However, Dr B did not consult Mrs A's family before making the decision, which he considers was an oversight on his part. He does not recall whether Mrs A's family were present at the time of his review on 23 Month1, and the records do not mention whether they were present. However, the clinical records state that family stayed overnight on 22/23 Month1 and were present later on 23 Month1. In my view, as Mrs A was unable to participate in a discussion, Dr B should have taken steps to arrange for a family member to be present when the decision was made to commence heparin.

150. Right 7(4) of the Code states that if a consumer is not competent to make an informed choice and give informed consent, the provider may provide services where it is in the best interests of the consumer. If the views of the consumer have not been ascertained, the provider should take into account the views of other suitable persons who are interested in the welfare of the consumer and available to advise the provider.

151. I am critical that in this case Dr B did not take reasonable steps to consult with Mrs A's family and answer any questions they had. However, I accept that it was appropriate and in Mrs A's best interests to commence anti-coagulation.

Administration of heparin

152. After taking advice from the Haematology team on 23 Month1, it was decided to start the administration of heparin to Mrs A. Despite the "Intravenous unfractionated heparin treatment" protocol being followed, Mrs A's aPTT results were persistently high. On 25 Month1, the result was 79 seconds. On 27 Month1, her aPTT result was over 180 seconds, and the heparin infusion and warfarin were stopped. Dr B said that the difficulties that Mrs A subsequently experienced did not result from the decision to start heparin, but occurred because she was anti-coagulated to a degree that far exceeded the intended level and, as a consequence, she suffered another intracranial haemorrhage.

153. Dr Gan advised that starting heparin was standard procedure. He also said that it could be argued that the prolonged over-coagulation caused the intracranial bleed rather than the re-starting of the heparin. He advised that Mrs A was either too sensitive to heparin, or she was not metabolising the heparin because she had renal failure. He stated:

> "Rather than doggedly following the protocol for many days, the advice of the haematology team should have been sought much earlier and the heparin stopped before she developed the intracranial bleed."

154. Dr Gan noted that the heparin infusion protocols in the ICU and the neurosurgical ward were appropriate. He advised that if a patient had abnormal aPTT results for only a day, or at most two days, and the patient had a bleed, that could be considered to be bad luck, because the effect of adjusting the heparin dose can take that long. However, the staff did not have the "common sense" to consult the Haematology team when it was obvious that adherence to the heparin infusion protocol was not working.

155. Dr Gan stated:

> "As a medical person should always have common sense and not blindly follow protocol and the patient suffered harm because of it, there is a departure from a standard of care."

156. I note that the Capital & Coast DHB Serious Sentinel Event Report states that there was possibly a false sense of security that the procedure being followed was safe in all circumstances. It recommended that the anti-coagulation policy be reviewed by both ICU and Haematology, specifically for patients who have an aPTT of over 180 seconds, as in such cases the rare nature and risk factors require a comprehensive and thoughtful plan.

157. In my view, Capital & Coast DHB staff displayed a concerning lack of critical thinking when Mrs A's response to the heparin infusion was not the norm, and continued to follow the protocol rather than consult the Haematology team.

Recommendations

158. I recommend that within three months of the date of this report, Capital & Coast DHB report back to HDC with an update on the implementation of the recommendations of the Serious Sentinel Event Report.

159. I recommend that within three months of the date of this report, Capital & Coast DHB undertake the following and report back to HDC:

- Provide training to clinical staff on communication pathways and record-keeping.

- Audit the provision of anti-coagulation therapy in cases where the aPTT level has remained above normal for more than a 24-hour period, to ascertain whether advice was sought from the Haematology service.

- Review the handover policy, particularly in relation to provision of information directly to consultants.

- Review the EWS policy to determine whether to include the requirement for regular and consistent GCS and EWS scoring; the early reporting and documentation of changes in scores; clear documentation that the appropriate clinician has been informed of the changes; and that the frequency of observations must increase if abnormal physiology is detected.

- Include in the EWS policy a requirement that, if a patient deteriorates, nursing staff must inform the medical team as soon as possible. If no satisfactory plan is formulated or the patient continues to deteriorate, the nursing staff must re-escalate to the consultant in charge and document the steps taken.

- Develop an escalation process for situations in which clinical care is impeded by concerned relatives of patients.

160. I recommend that Capital & Coast DHB audit the clinical records of 50 patients whose EWS scores indicate that they were deteriorating, to ascertain whether the "Adult and paediatric vital sign measurement, early warning score and escalation" policy was complied with; and within three months of this opinion report back on the outcome of the audit and any steps being taken to remedy any failures to comply with the policy.

161. I also recommend that Capital & Coast DHB provide a formal written apology to Mrs A. The apology is to be sent to HDC for forwarding, within three weeks of the date of this report.

Follow-up actions

162. A copy of this report with details identifying the parties removed, except Capital & Coast DHB and the experts who advised on this case, will be sent to the Health Quality & Safety Commission, the National CMO Group, the Stroke Foundation of New Zealand, and Central TAS, and placed on the Health and Disability Commissioner website, www.hdc.org.nz, for educational purposes.

Appendix A: Independent nursing advice to the Commissioner

The following expert advice was obtained from RN Vivienne Josephs:

> "Thank you for the request that I provide clinical advice in relation to the complaint from [Mr A] regarding the care of his wife, [Mrs A], provided by Capital & Coast District Health Board (CCDHB). In preparing the advice on this case to the best of my knowledge, I have no personal or professional conflict of interest. I agree to follow the Commissioner's Guidelines for Independent Advisors.
>
> I have been asked to advise whether [Mrs A] was provided with a reasonable standard of nursing care by the nursing staff at CCHDB during the period 23 [Month1]–28 [Month1] and specifically the standard and appropriateness of the nursing care on 28 [Month1] after the CT scan at 0212 am until the consultant review at 1300pm.
>
> **Documents reviewed**
>
> a) Letter of complaint dated […]
>
> b) Response from CCHDB dated […]
>
> c) CCDHB Serious adverse event report dated […]
>
> d) CCDHB Policy and Procedures regarding Heparinization
>
> e) Clinical records from CCDHB from 22 [Month1]–28 [Month1]
>
> f) Medication documentation from 22 [Month1]–28 [Month1]
>
> g) Response from [RN E] dated […]
>
> h) Email from [RN I], Clinical Nurse Coordinator, Neurosurgery dated […]
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> **Background**
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> Following a CT scan at [Hospital 1] on 18 [Month1], [Mrs A] was transferred to [Hospital 2] for an evacuation of an intracerebral haematoma. She required readmission to ICU on 23 [Month1] for respiratory complications and on 26 [Month1], she was transferred back to the neurosurgical ward. She had been on intravenous heparin from 25 [Month1] to 27 [Month1] with high APTT (Activated Partial Thromboplastin Time) levels. At 1.30 am on 28 [Month1], following a decrease in [Mrs A's] GCS (Glasgow Coma Scale)[1] and a large vomit, she was seen by the registrar. A CT was performed which showed an acute subdural bleed with oedema and a midline shift. The neurosurgical registrar consulted with the on call consultant and the decision was made to continue observations. [Mrs A's] neurological status continued to deteriorate over the morning. She was seen by the neurosurgeon, [Dr B] at 1300 and an urgent CT scan performed. She returned to theatre for a decompressive craniectomy at 1415 hrs.

[1] The Glasgow Coma Scale was developed as a tool for assessing patients with neurological injury. It measures Eye opening, Verbal and Motor responses and is scored from 3 (lowest) to 15.

Complainant account in relation to the advice required

[Mr A] states that after his wife vomited at 12.30 pm (date not documented), she had a scan that showed swelling in her brain *(an event)* had occurred. He was told by the doctor at 3.30am that it would be reviewed in the morning. He returned at 7.30am to find his wife's condition had deteriorated and she was struggling with breathing and touching her head *(in pain).* He showed this to the duty nurse at 7.45am but states that no action was taken. He said another member of the neuro team came in but again no action was taken. At 11am, there was a ward round but [Mrs A] was not examined. [Mr A] was told by [the charge nurse] *(i)* that [Dr B] would be coming around 12 noon. At 12.30pm [Dr B] spoke with the family and explained that the scan showed [Mrs A] needed urgent surgery.

Provider responses

a) CCDHB Serious Adverse Event Report

[Mrs A] was first reviewed at 0130 by the neurosurgical house officer and registrar in response to notification by nursing staff of a large vomit. They noted that there was a 1 point GCS drop and organised a CT head to check for a re bleed.

After the results of the scan were discussed with the consultant surgeon on call, the plan was for ongoing observations. If the GCS dropped, there would be further discussion. The report stated that the registrar checked the status of the patient overnight with the nurse in charge and there was no further change in GCS.

The plan was for [Mrs A] to be seen as a priority on the ward round that morning and then discussed with consultant in charge.

When [Mrs A] was seen at 0905 hrs, the deterioration in GCS was not picked up. The surgeon was reminded of the scan result at 1030 hrs and asked if the patient was okay and this was confirmed. A review of [Mrs A] was delayed as another patient required urgent review and the surgeon believed patient to be stable.

The surgeon was later contacted by the charge nurse to see [Mrs A] and her family '*to help ameliorate the ongoing difficulties the staff were having meeting the family's needs'*. The surgeon, on review, found her GCS to be 3 and an urgent scan was organised.

The review found that recognition of the patient's GCS reduction to 9 from 12 the previous day might have prompted a different plan of care. Overnight, [Mrs A] had a fluctuating GCS and anisocoria[2]. They found that, according to the clinical notes, [Mrs A's] acute deterioration began between 0930–10am when clinical signs included her lower limbs not responding to painful stimulus and the right pupil becoming non reactive. The review also stated that there was deterioration at 1115 hrs with the left pupil becoming non reactive.

[2] Unequal pupil size

They concluded that *'the recognition of these subtle yet clear neurological signs which persisted rather than fluctuant, concludes that deterioration was occurring and the dependence on a pending review by the Neurosurgeon may have created an unnecessary delay of this woman's review by a matter of 1–3 hours'*. The review team recommended that education be provided to RMOs and nurses around expectation for escalating concerns to the responsible surgeon despite plans for a pending ward review.

Their organisation wide recommendations were for:

(i) A review of the anti coagulation policy specifically for complex patients who have lifelong anti-coagulation needs along side an acute injury or illness
(ii) A review of the education provided at orientation and reiteration to RMOs of the need for timely handover of clinical information to the responsible consultant
(iii) An update of the EWS[3] (Early Warning Score) to reflect that in the case of ongoing deterioration, re-escalation needs to occur. This case was to be presented to emphasise the expectation for nurses to escalate concerns when further deterioration occurs despite plans for a pending review

b) Response from [RN E] dated […]

[RN E] was the nurse allocated to care for [Mrs A] for the morning shift (0700–1530 hrs) on 28 [Month1]. He was working as preceptor with a nurse new to the area. They were looking after four patients. [RN E] had not cared for [Mrs A] previously. He received handover from the night nurse at the beginning of his shift, and was told that her condition had been deteriorating, that she had had an urgent scan and that her pupils were '*considered a difficult issue because of their fluctuating response, due to her glaucoma. This meant her pupils did not respond at times and therefore were not a reliable sign'.* The plan was for the nursing staff to *'judge her clinical picture by vital signs and rousability'.* [RN E] was advised that [Mrs A] was to be reviewed by the day medical team.

At his 0730 hrs assessment, [RN E] performed neurological observations and a physical examination. He found that [Mrs A] responded to pain but found it difficult to ascertain if she was obeying command purposefully. He noted this as being a drop in her GCS. He asked the medical team to review [Mrs A] before they attended their radiology meeting. At 0800 hrs, a note was left for [RN E] in the ward message book that he was to continue two hourly neurological observations and ensure [Mrs A] had no anticoagulant therapies. [RN E] stated that he had assumed the team had seen [Mrs A] and learnt later that was not the case. He updated [Mr A] with his plan of care. [RN E] stated that he was intimidated by [Mr A] and felt hindered in objectively assessing [Mrs A]. [RN E] discussed [Mrs A's] deterioration and the difficulties dealing with [Mr A's] aggressive behaviour with his Clinical Nurse Manager (CNM). He was advised that the consultant was coming to review [Mrs A]. [RN E] continued to update

[3] EWS looks at patients' vital signs to identify the deteriorating unwell patient. It has a largely cardiovascular focus

the CNM of [Mrs A's] condition during the shift. At 1015 hrs, [RN E] found [Mrs A] less responsive and advised the CNM. He was advised that the Consultant review was imminent.

[RN E] told the doctors at 1100 hrs on the ward that [Mrs A] was not obeying commands, was responding slightly to touch and that her eyes needed to be physically opened to check *'given [Mrs A's] glaucoma'.* His expectation, based on this conversation, was that [Mrs A] would be seen. This did not take place.

He continued to check her observations and perform usual nursing care. According to [RN E], she remained '*inconsistent in her reactions and responses'.* At 1300, [Mrs A] was seen by the consultant, a CT scan was undertaken and plans made to take her to theatre.

[RN E] was unable to document his clinical notes at the time as the file had accompanied [Mrs A] to theatre. He wrote them retrospectively at 1530 hrs and later added additional notes two days later.

Nursing Comment: I could find no reference to [Mrs A] having glaucoma in the clinical notes or in her past medical history. I note that glaucoma was mentioned in a later CCDHB response dated […].

c) Response from Clinical Nurse Manager, [RN I] dated […]

[RN I] stated that she called [Dr B] (consultant) around 1030 hrs on 28 [Month1] to check whether he was intending to be on the 1100 hrs ward round and if he was not, then asking him to see [Mrs A]. She did not supply any clinical information as she understood that he would have been advised by the medical team. [RN I] stated that her perspective at that time was the difficult relationship with [Mr A] and that the consultant should see him. She advised [Mrs A] and her partner that [Dr B] would be coming to see her but did not confirm a time. She also advised the registrar that she had called [Dr B].

Review of clinical records specifically 27–28 [Month1]

From 1240 hrs to 1700 hrs on 27 [Month1], [Mrs A] had been cardiovascularly stable. Her neurological observations had been consistent with a GCS between 10–11 (eyes opening spontaneously, PERL[4], full strength in her left limbs, severe weakness in her right leg and no response in her right arm, no verbal response and obeying commands).

At 2100 hrs, her GCS had dropped to 10, both pupils remained reactive, but her eyes were now opening to pressure. Verbal and motor responses were the same as at 1700 hrs. She was documented as having pain. At 0020 hrs, her observation chart shows that her GCS was now 11 but that her pupils were unequal but reactive. Her motor and verbal responses were unchanged and her eyes were now opening to sound. Her

[4] Pupils Equal and Reacting to Light

pupils remained unequal but reactive. At 0100, her blood pressure was recorded as 152/82, her eyes were not opening, her pupils were unequal and her right eye response was now sluggish.

At 0130 hrs, nursing staff notified the medical team of a large vomit and she was seen and examined by the house officer and registrar. A chest x-ray, bloods and CT head were ordered. At 0212 hrs, a CT was performed. The next observations at 0300 found her cardiovascularly stable, her eyes opening to pressure only and a GCS of 9. At 0336 hrs, the registrar entry notes the result of the CT which showed a fresh bleed, increased oedema and increased midline shift. Following discussion with the on call consultant, the orders were to continue observation and that no surgical input was advised at this stage.

At 0530 hrs, her observation chart showed a GCS of 10, eyes were now opening to sound but no other changes in verbal or motor responses. The 0700 hrs clinical nursing notes record the observations, the episode of vomiting and that the naso gastric feed had been stopped. The APTT was recorded at >180, the heparin infusion had been discontinued and a further APTT had been sent.

At 0900, it appears from the observation chart that both pupils had a sluggish response and the motor response in both sides was reduced. The GCS is entered as 8. In the 0905 medical notes, the registrar documented that [Mrs A] had been drowsy overnight, that a new parafalcine bleed was seen on scan and that the chest x ray did not show aspiration. The GCS was noted as being 8–9. Plan was for 0_2 via mask, to remain on NBM until the review later that morning and that the anticoagulants were to be stopped.

At 1020hrs and again at 1115 hrs, the observation chart shows a GCS of 8 with the right pupil dilated and non reactive. There is no movement in either leg and a new weakness in left arm.

There are no further nursing or a medical clinical notes till [Mrs A] was seen at 1300 by [Dr B] where the deteriorating GCS was noted and an urgent CT scan ordered.

At 1520 hrs, nursing notes documented that the patient had deteriorated during the shift and documenting that the family were present.

Clinical advice

I have been asked to advise on the standard and appropriateness of the nursing care provided by the nursing staff at CCDHB on 28 [Month1] after the CT scan at 0212 hrs until the consultant review at 1300 hrs. In particular:

a) The recognition of and response to [Mrs A's] continued deterioration following the CT scan at 0212 hrs 28 [Month1] until the consultant review at 1300hrs

Prior to the CT scan of 0212 hrs, the night nursing staff had recognised the significance of a large vomit and decreasing GCS in raised intracranial pressure and had appropriately contacted the medical team leading to the CT scan being performed.

Following [Mrs A's] scan at 0212 hrs, clinical observations were taken at 0300 hrs, 0530 hrs, 0900 hrs, 1020 hrs, 1115 hrs and 1225 hrs. At 0300 hrs, [Mrs A's] GCS (Glasgow Coma Scale)[5] had dropped one point to 9 from the GCS taken at 0100. Although there had been previously fluctuant GCS scores, there had not previously been no response to eye opening nor a GCS score of 9. There is no documentation to state that the GCS drop to 9 was communicated to the registrar prior to his phone call to the consultant at 0336. There is no documentation in the clinical notes by medical or nursing staff of aniscoria[6]. If the drop in GCS had been conveyed to the registrar but not documented, I would consider this a mild departure from accepted practice.

Following the registrar's call to the consultant, the registrar explained in the Clinical Adverse Event report that @0320 *the plan was for ongoing neurological observations. If GCS dropped, was for further discussion.* This was not documented in the clinical notes, neither was the frequency of observations required documented. Despite the absence of specific medical orders regarding the frequency of ongoing observations, the drop in GCS and results of the CT scan should have dictated that hourly observations would have been recommended. I would consider this a mild departure from accepted practice.

By 0900, there was a significant change in [Mrs A's] neurological observations.

The 0905 ward round documents a GCS of between 8–9 but the significance does not seem to have been noted. There is no documentation in the clinical notes that the patient had been examined or that the GCS drop had been recognised and discussed by medical/nursing team. In [RN E's] account, he saw the message in the communications book, following the ward round, to continue two hourly observations and assumed the doctors had seen [Mrs A]. He states that he was hampered in taking observations by [Mr A] who he states was behaving aggressively. He informed his Charge Nurse Manager (CNM) of both deteriorating condition and [Mr A's] difficult behaviour. I would consider that the notification by [RN E] of his concerns to his CNM, an acceptable standard of practice as it is often difficult for nursing staff to locate medical colleagues on an acute ward to convey concerns, hence the use of the communications book. However, acute concerns always require direct [communication].

I note also, that [RN E] had increased his neurological observations to hourly in recognition of the deterioration and had escalated his concerns.

[5] The Glasgow Coma Scale was developed as a tool for assessing patients with neurological injury. It measures Eye opening, Verbal and Motor responses and is scored from 3 (lowest) to 15.
[6] Unequal pupil size

The next documented observation was one and a half hours later at 1020 hours where the right pupil was found to be 5mm and non reactive. This should have been immediately escalated to the medical team as non reactive pupils indicate significant pressure and an urgent immediate medical review is required. Additionally, there was now no leg movements bilaterally and a new weakness in the left arm. There is no documentation that the neurosurgical team was notified. [RN E], in his account, states that he advised the CNM that [Mrs A] was less responsive, who advised him that the consultant review was imminent. The CNM contacted [Dr B], the consultant, but the focus appears to be on the difficult behaviour of [Mr A] and not on the clinical deterioration. There was no clinical information conveyed regarding the deterioration in [Mrs A's] condition and current neurological status, specifically the new fixed non reactive pupil.

Nursing Opinion

It appears that [Mrs A's] neurological deterioration was recognised by the nursing staff but that there is evidence of significant miscommunication between the health care team looking after [Mrs A] affecting the appropriateness of the response. [RN E] recognised [Mrs A's] deteriorating condition and assumed from the message book that she had been seen by the medical team on the early morning ward and that she was soon to be reviewed by the consultant. [RN E] stated that he continued to voice his concerns to the CNM and the associate CNM who confirmed that [Mrs A] would be seen soon by the consultant. [RN E] also stated that he informed the doctors at 1100 hrs of [Mrs A's] decreased responsiveness. The CNM contacted the consultant at 1030 hrs to confirm his imminent visit and concerns regarding [Mr A's] behaviour but did not update him on the patient's deteriorating clinical status, assuming that he had already been informed by his medical team. The CNM informed the registrar that she had spoken with [Dr B] but did not confirm with them that [Dr B] was aware of [Mrs A's] neurological status.

Despite the assumptions that 'everyone thought the other knew', it would be seen, in my opinion and in those of my peers, as a significant departure from accepted practice that the neurological deterioration noted at the 1020 hrs observations was not communicated urgently and directly to [Dr B] at the CNM's 1030 hrs call or at least conveyed directly to the neurological registrar. It appears that the difficulties with [Mr A's] interactions with staff and the knowledge that the consultant would soon review [Mrs A], overshadowed the seriousness and urgency of the immediate clinical concerns. This would be seen as a departure from principle four of the nurses Code of Conduct.[7]

b) The clinical documentation during this period

Documentation in the clinical notes of [Mrs A's] deteriorating neurological status and the communications between family and other members of the team is very poor. There is no documentation of escalation or increasing concerns in her condition being

[7] New Zealand Nursing Council Code of Conduct 2012

conveyed to specific members of the medical/nursing teams at any time between 0905 hrs and 1300 hrs.

[Mr A] states in his complaint to HDC, that he noticed his wife's gradual deterioration on the morning of the 28 [Month1] and expressed his concerns to the nursing staff. There was also concern by the nursing staff of [Mr A's] behaviour. There was no documentation in the clinical notes of either of these ongoing concerns.

Nursing Opinion

The lack of documentation of clinical concerns and of medical and nursing communication was a significant factor in the delayed response to [Mrs A's] clinical deterioration.

Comment on the response provided by CCDHB

The response to question five regarding the timeliness of the reporting of [Mrs A's] condition to [Dr B] on 28 [Month1] does not, in my opinion, answer the question. The answer focuses on the *usual ward round timing* being consistent whereas the question appears to relate to the timeliness of notification in a deteriorating clinical scenario.

Comment on the CCDHB Serious Adverse Event Review report's recommendation to update the Early Warning Score Policy

The CCDHB Serious Adverse Event Review report found that unfortunately 'the *small but significant continuing drop in GCS was not picked up'.* The main factor in this case is the delayed response to and escalation of a falling GCS and deteriorating neurological status not the EWS.

The three components of the GCS (Eyes, Voice, Motor) are the most sensitive indicator of neurological deterioration, compared to other changes such as vital signs. Changes in neurological status would not be picked up initially by the EWS as it largely measures cardiovascular status, but would become latterly significant with a worsening GCS.[8] What is of note in [Mrs A's] case, is the lack of consistent documentation of EWS scoring from 26 to 28 [Month1] and specifically the absence of documentation over the night of 27 and 28 [Month1].

The recommendation from the Serious Adverse Event review regarding the EWS policy, in my opinion, should be on the importance of regular and consistent GCS and EWS scoring and the early reporting and documentation of changes as well as clear documentation that the appropriate clinician has been informed, rather than updating the current policy. I would also add that the frequency of observations must increase if abnormal physiology is detected.

Additional Comments

a) It appears that nursing staff followed the hospital protocols for the titrating of the intravenous heparin administration according to APTT levels. However, it is clear

[8] Waterhouse, C (2005). *The Glasgow Coma Scale* Nursing Standard April 27–May 3 19: (33)

that the adjustments being made to bring the APTT into therapeutic range were not successful, for whatever reason, despite adherence to protocol. Although there was no departure from accepted practice in this regard, nursing assessment requires looking beyond adherence of protocol to discuss clinical issues with nursing and medical colleagues when established protocols don't seem to be working for specific patients.

b) I was unable to locate any clinical notes that documented the transfer from the ICU protocol for IV heparin administration to the general ward protocol.

Viv Josephs, RN, BHSc, PGCert (Nursing)
Nursing Advisor
Health and Disability Commissioner"

Further expert advice received from Vivienne Josephs on 18 June 2018

"Following my advice of 26 February 2018, I have read the responses from [RN I], [RN H] and [RN G] and re read the initial response from [RN E].

1. I have reviewed the responses from [RN H] and [RN G] and now find no departure from an accepted standard of practice in regards to documentation of the change in GCS in the clinical notes. I agree that [Dr D's] clinical entry regarding his review and GCS assessment at 3.30am is sufficient documentation that communication took place.

2. An adverse comment would be that there was no documentation in the clinical notes regarding the frequency of observations requested by [Dr D]. If [RN H] had received verbal instructions from [Dr D] for two hourly observations, recommended practice would be to document this in the clinical notes.

3. If [RN I] did not recall any clinical information relating to [Mrs A's] deteriorating condition prior to 10.30am and was therefore unable to escalate concerns to the consultant, then there is no departure on [RN I].

4. On 28 [Month1], at 10.15am [RN E] observed that [Mrs A] had clinically deteriorated.

4 (i) Scenario A: On 28 [Month1], at 10.15am, if [RN E] had escalated his concerns to the doctors, there would be no departure from accepted practice.

4 (ii) Scenario B: On 28 [Month1] at 11.00 am, if [RN E] had failed to escalate concerns to the Doctors (rounding) about [Mrs A's] deterioration, there would be a significant departure from accepted practice.

4 (iii) Scenario C: On 28 [Month1] after the deterioration at 10.15am was noted, if [RN E] had failed to escalate the concerns directly to EITHER the Consultant [Dr B] OR the neurosurgical registrar, there would be a significant departure from accepted practice."

Appendix B: Independent neurosurgery advice to the Commissioner

The following expert advice was obtained from Dr Peter Gan, a consultant neurosurgeon:

"**1. INTRODUCTION**

1.1 This report is based upon case note review of [Mrs A] provided by HDC:-

- Letter of instruction from HDC with questions dated […]
- Letter of Complaint dated […]
- Responses from Capital & Coast DHB dated […]
- Reports from [Dr B] […]
- Photocopied hospital records from Capital & Coast DHB covering the relevant period
- Serious adverse event review report from Capital & Coast DHB
- Relevant Capital & Coast DHB protocols, guidelines and policies
- CD containing relevant images done as below:

    1. CT Head 18 [Month1]
    2. CT Head 19 [Month1]
    3. CT Head 28 [Month1] 2 am
    4. CT Head 28 [Month1] 1330 pm
    5. CT Head 2 [Month2]

2. CIRCUMSTANCES OF THE INJURY

2.1 [Mrs A] [has a] significant medical history which includes asthma, Graves' disease requiring thyroidectomy at age 20 years of age, Rheumatic heart disease requiring aortic and mitral valve replacement in 2000 and chronic renal failure due to membranoproliferative glomerulonephritis in 2015.

2.2 She required regular thyroxine, prednisolone, salbutamol and Symbicort inhalers and Warfarin daily.

2.3 [Mrs A] presented to [Hospital 1] with right sided weakness in her face, arm and leg on the 18 [Month1]. A CT head showed a large left parietal intracerebral haematoma with midline shift.

2.4 Initially her Glasgow Coma Scale was 15/15 but she then dropped it to 13/15 and then to 6/15 i.e. deep coma with bradycardia. She was then immediately intubated and ventilated and was transferred to [Hospital 2] under the care of ITU and neurosurgery.

2.5 She was taken to surgery after discussion with the family and had a craniotomy and evacuation of the intracerebral haematoma on arrival to [Hospital 2] ITU.

2.6 She was kept asleep in ITU. A repeat CT head scan was done on the 19 [Month1] which showed satisfactory appearances.

2.7 [Mrs A] was noted to be obeying commands with a right hemiparesis after sedation was taken off on the 20 [Month1] early morning and was extubated at 9:45am. GCS was noted to be 10/15, E3V1M6 (eyes opening to speech, no verbal response and obeying commands) in the afternoon.

2.8 She was deemed safe to be transferred to the neurosurgical ward on the 21 [Month1]. At transfer, she was noted to be GCS11/15, E4V1M6 (eyes opening spontaneously, no speech and obeying command).

2.9 In the neurosurgical ward, her conscious level fluctuated between 10–12/15. [Mr A] noted that she was able to say isolated words and move her right foot to commands. Decision was made to start heparin after taking advice from the haematology team on the 23 [Month1].

2.10 On the evening of the 23 [Month1], [Mrs A] was readmitted to ITU because of increased secretions on her chest and poor cough requiring frequent suctioning and increased nursing care to avoid aspiration. GCS was noted to be 10/15, E3V1M6.

2.11 Throughout her stay in ITU, heparin infusion was continued. Initial APTT readings were low but jumped to 79 on the 25 [Month1] and went even higher the next few days at >180 on the 26 [Month1] and the 27 [Month1]. That was despite the hospital's protocol being followed (see note on the 26 [Month1] at 1235 hours).

2.12 In ITU, her conscious level continued to fluctuate between GCS of 10–12/15. There were several occasions she was charted as E4V2M6 (Eyes opening spontaneously, making incomprehensible sounds and obeying commands). She was well enough to be discharged back to the neurosurgical ward on the 26 [Month1].

2.13 On the neurosurgical ward, [Mrs A] remained stable but her APTT readings continued to be very high. 3mg of warfarin was also given at 0815 hours on the 27 [Month1]. At 2240 hours, 27 [Month1], just before she deteriorated, her APTT readings were >180 and the heparin infusion and warfarin was stopped after that.

2.14 On the 28 [Month1] at 0130 hours, she had a large vomit and dropped her GCS to 10/15 from 11/15 with a sluggish right pupil. A CT scan of the head was done at 0200 hours which showed a thin left interhemispheric acute subdural, a small thin left convexity subdural with increased swelling and midline shift of 8–9 mm. After consulting the consultant on-call, decision was made to observe her.

2.15 Her conscious level continued to deteriorate. A nursing note at 0715 hours, 28 [Month1] charted her GCS to be 9–10/15, E2–3V1M6 with a large left pupil and a ward round note at 0905 described her to be very drowsy with a poor M6. However, her GCS was still 9/15, E1V2M6. APTT was noted to be 49 at 0645am.

2.16 At 1300 hour, 28 [Month1], she was seen by [Dr B] and her GCS was noted to be 7/15, E1V1M5 (No eye opening, no speech and localising to pain. I could not find any documentation of her GCS in between 0905 and 1300 hours).

2.17 An urgent CT head was done 30 minutes later which showed increase in size of the interhemispheric and convexity subdural bleed with more swelling and mass effect and midline shift.

2.18 Her coagulation status was reversed back to normal and she was taken to theatre urgently and underwent decompressive craniectomy — taking out the bone flap so as to create space for the brain to swell.

2.19 After surgery, she was readmitted to ITU. Initially her pupils were noted to be size 4 and not reactive. On the 29 [Month1], she was noted to be localising to her endotracheal tube with her left hand and opening her eyes to pain.

2.20 She was eventually extubated on the 31 [Month1] at 1600 hours. Her GCS was noted to be fluctuating between 7/15 to 10/15, E3V1M6 with no movement in the [right] at all.

2.21 [Mrs A] improved slightly to a GCS of 11/15. A repeat CT head was done on the 2 [Month2] which showed improved appearances. The neurologist suggested an EEG because of her fluctuating GCS to rule out seizures. I cannot find the result of the EEG. Levetiracetam was started.

2.22 She was discussed with the [on-call cardiothoracic surgeon] on the 3 [Month2]. The risk of thrombosing her aortic valve was estimated at 80% per year and the risk of thrombosing her mitral valve was moderately high although a figure was not given. With 2 valve replacements and in the context of atrial fibrillation, she was deemed a very high-risk patient for thrombosing her valves. The decision was to avoid heparin and to start warfarin slowly aiming for an INR between 2 to 2.5.

2.23 [The] on call cardiologist was also consulted who agreed with the cardiothoracic surgeon but also recommended a transoesophageal echogram to rule out clots forming in the heart valves. He also said that it is not normal to receive no anticoagulation for more than 48 hours with mechanical heart valves.

2.24 The transoesophageal echogram was done on the 4 [Month2] which showed no significant thrombus formation in either heart valve. However, anticoagulation was not started straightaway as she was already on low molecular weight heparin subcutaneously for prophylaxis of deep vein thrombosis.

2.25 Her GCS remained generally stable throughout her stay in ITU with occasional dips to 7–8/15. She was eventually stable enough to be discharged to the neurosurgical ward on the 6 [Month2]. At transfer, her GCS was noted to be 11/15, E4VIM6.

2.26 Her condition remained stable in the neurosurgical ward although her GCS occasionally dips to 8–9/15. She developed jaw pain with locking of her jaw and temporomandibular joint dysfunction was diagnosed and treated. She also developed

a urinary tract infection, E Coli, on the 16 [Month2] requiring treatment with antibiotics.

2.27 Her warfarin was eventually restarted on the 10 [Month2] at her previous regular dose. Her INR was reasonably well controlled within 2–2.5.

2.28 [Mrs A] was eventually discharged to the medical team in [Hospital 1] for continuing rehabilitation. Her GCS at discharge was 11–12/15, E4V1–2M6 with a dense right sided weakness.

3. ANSWERS TO QUESTIONS

Regarding the care provided by Capital & Coast DHB:

3.1 The standard of the overall management of [Mrs A's] anticoagulation following commencement of heparin infusion on 23 [Month1] including:

3.2 Information and consenting process

I could not find any detailed documentation concerning the information given and the consenting process regarding the commencement of heparin infusion on 23 [Month1] other than a brief note in the medical notes that IV heparin was started.

The standard of care/accepted practice is to inform the family and patient and ask the patient for her consent and document that in the notes. Apparently, the family was informed as according to the letter of complaint from [Mr A], he did question several times why heparin was needed which means he was informed about the heparin infusion but was unclear on why it was needed, suggesting that the information given was not adequate or he was unable to understand why. I view the departure from the standard of care was small as it is mainly a communication issue and am confident that my peers will view it as such.

I would recommend that in the future detailed information on why and how heparin infusion and the risk of the infusion are given to the patient and family so as informed consent can be obtained. This then must be recorded in detail in the notes.

3.3 Clinical appropriateness of commencing the infusion.

Starting heparin is a standard procedure in a patient who was on warfarin before surgery, especially since [Mrs A] had double valve replacement in her mitral and aortic valves and she developed atrial fibrillation as well during her postoperative period. The risks of thrombus forming around the heart valve was found to be very high (please see 2.22) with a mortality of at least 10%[1] despite treatment.

The reason that heparin is usually favoured rather than warfarin is that heparin is short acting and is rapidly reversible with intravenous protamine if a clot develops that requires surgical evacuation as in this case. The risks of developing a recurrent

[1] Roudaut R, Serri K, Lafitte S. Thrombosis of prosthetic heart valves: diagnosis and therapeutic considerations. Heart. 2007 Jan 1;93(1):137–42.

intracranial haemorrhage is found to be rare[2]. However, the heparin dose must be monitored very closely so as not to over coagulate the patient. In this case it can be argued that it is the prolonged APTT ratio (over coagulation) for several days that caused the intracranial bleed rather than the restarting of the heparin that caused it.

When to start heparin is still unclear as there is no medical evidence or papers that conclusively answer this question. The cardiologists/cardiothoracic surgeons usually like anticoagulation of some form to be restarted as soon as possible after the patient is stable. A paper suggested restarting warfarin 7–14 days after an intracranial bleed and 48 to 72 hours after an extracranial bleed[3] [and] after looking at numerous other papers [this] probably constitute[s] reasonable guidance on the subject.

Hence, I would consider starting heparin infusion … in patients with valve replacement and atrial fibrillation to be the standard of care for the reasons stated above. I would personally, however, prefer to start the heparin at least 7 days after the bleeding event in my practice, yet as there is no conclusive class 1 medical evidence to determine when it should be restarted, there is no deviation from the standard of care. I am confident that the majority of my peers would agree with me.

3.4 Adequacy of the heparin infusion protocols for the ICU and the relevant ward.

The heparin infusion for the ICU and neurosurgical ward although slightly different is informative and contained detailed instructions on what to be done and how to alter the heparin dose in the advent of an APTT result that is not desirable.

In my view, it is more than adequate for ICU and the neurosurgical ward. The reason that the APTT levels were supratherapeutic for so long despite the protocols was because it was a rare event that a patient was either too sensitive to the heparin or not metabolising the heparin as she had renal failure[4]. Rather than doggedly following the protocol for many days, the advice of the haematology team should be sought much earlier and the heparin stopped before she developed the intracranial bleed.

There is no deviation of standard of care in the adequacy of the heparin infusion protocols of either the ICU or the neurosurgical ward which my peers would agree with me.

3.5 Compliance with the protocols in terms of changes made to [Mrs A's] heparin dosage and APTT monitoring in general.

As above, looking through the clinical notes, the protocol was adhered to in terms of changes made to [Mrs A's] heparin dosage and APTT monitoring in general. I found

[2] Butler AC, Tait RC. Restarting anticoagulation in prosthetic heart valve patients after intracranial haemorrhage: a 2-year follow-up. British journal of haematology. 1998 Dec 1;103:1064–6

[3] Panduranga, P, Al-Mukhaini, M, Al-Muslahi, M, Hague, MA, & Shehab, A. Management dilemmas in patients with mechanical heart valves and warfarin-induced major bleeding. World Journal of Cardiology. 2012 4(3), 54–59. http://doi.org/10.4330/wjc.v4.i3.54

[4] Boneu B, Caranobe C, Sie P. Pharmacokinetics of heparin and low molecular weight heparin. Baillieres Clin Haematol. 1990 Jul;3(3):531–44.

that the staff doggedly followed the protocol in reducing the heparin and APTT monitoring in general.

There is no deviation from the standard of care in the compliance with the protocols which I am confident that my peers would agree with me. As above, the only criticism I have is that the staff did not have the common sense to consult the haematology team despite the prolonged supratherapeutic APTT levels after adhering to the protocol which was obviously not working.

3.6 Adequacy of the monitoring given the persistently supratherapeutic APTT levels from 2100 hours on 25 [Month1].

The monitoring given the persistently supratherapeutic APTT levels from 2100 hours on 25 [Month1] is in my opinion, adequate and according to protocol of the ICU and ward. There is no deviation in standard of care in the adequacy of monitoring which I am confident that my peers would agree with me.

As above, the only criticism I had was that the staff did not think to consult the haematology team for advice after struggling for a few days to control the APTT ratios and I would suggest that in the protocol to be inserted an advice to contact the haematology team when that occurs.

3.7 The overall standard of [Mrs A's] management following her deterioration in the early hours of 28 [Month1], and particularly following receipt of the CT scan performed at 0212 hours on that date.

The overall standard of [Mrs A's] management following her deterioration in the early hours of 28 [Month1] and particularly following receipt of the CT scan performed at 0212 hours, in my opinion, fell below accepted standards. The detection of and response to her deterioration was adequate and not delayed. The CT head was ordered and the results obtained appropriately without delay and the consultant informed appropriately.

The decision not to proceed to surgery at that time although the CT head showed new intracerebral bleed with more swelling is understandable (not ideal) as her Glasgow Coma Scale was maintained at 10/15, from 11/15, with [Mrs A] being drowsier. The decision is understandable because at 2am in the morning, even if the decision was for surgery, it would realistically mean that the surgery would probably have started after 5 am after the anticoagulation is reversed and rechecked, the theatre being set up and the neurosurgical staff called in as it is a specialised operation. Also at that time, with a skeleton on call staff and a tired surgeon, the risks of making a mistake in the operation is higher as well.

The decision not to operate at that time should not be taken to mean that the patient was not for an operation at all. The right decision, in retrospect, would be to fast and continue to observe [Mrs A] overnight, if she continues to deteriorate to operate and if she remains stable until the morning ward round at 8 am, to inform the consultant in charge relatively urgently of her CT head scan and her condition so the consultant is

aware of her condition and can then make a decision about her management. As it is, she was seen in the morning ward round at 9am, put nil by mouth awaiting a review by the consultant in charge but somehow the consultant in charge, [Dr B], was not informed or informed incorrectly of her condition and did not see her until 1300 hours which was unacceptable. There was a lack of communication between the registrars and the consultant.

The nursing staff is not without blame as [Mrs A's] condition continued to deteriorate as observed by the nursing staff (entry 0745) and the medical staff (0905) yet, after that there was no documentation in the medical notes until she was seen by [Dr B] at 1300 hours. On the observation charts, there was a gradual drop from 12 to 8 over the period until her GCS was charted to be 6/15 at 1300 hours. At no point during her deterioration over that period was anyone informed and it seemed to be accepted that she would need to be seen by the consultant in charge before anything would be done.

The standard of care is that if a patient continues to deteriorate, the medical staff especially the consultant in charge of the patient should be informed as soon as possible and surgery to release the pressure in the head and reduce intracranial swelling should be done as soon as practically possible. There is definite deviation from the standard of care which was moderate and resulted in delay of emergency surgery for [Mrs A]. I am confident that the majority of my peers would have found it so.

I would recommend that in the future, if a patient continues to deteriorate as in the case of [Mrs A], the nursing staff must inform the medical team as soon as possible and if no satisfactory plan is formulated or the patient continues to deteriorate despite the plan, the nursing staff should re-escalate it to the consultant in charge so as to make sure that he/she knows the condition of the patient. All this should be documented in detail in the patient's notes.

3.8 The general standard of clinical documentation particularly in regard to anticoagulation management.

As discussed above, concerning [Mrs A's] deterioration in the early hours of the 28 [Month1] and subsequent management thereafter, the standard of clinical documentation was poor with gaps in between periods of 0905 to 1300 when her condition was deteriorating. Also, a definite plan was not formulated except that she needed to be reviewed by the consultant in charge yet nothing was documented or ascertained on whether the consultant was informed or not about the patient's condition.

The general standard of clinical documentation in regard to anticoagulation in ITU was good and in the neurosurgical ward was satisfactory as there was an IV heparin nursing administration record where the changes in APTT and the subsequent infusion rate changes were charted.

There is definite deviation in the standard of care in the general standard of clinical documentation in regard to [Mrs A's] deterioration which is moderate and no deviation in the general standard of clinical documentation in regard to anticoagulation management.

Recommendation is that all the details and management plans of the patient should be reviewed regularly and documented succinctly and in detail in the notes by the medical and nursing team.

3.9 Adequacy of the remedial/improvement measures noted in the DHB incident report.

The remedial/improvement measures noted in the DHB report were:

1. That discussion with the family as to the risks and benefits of starting heparin is ideal but would not have altered the absolute necessity to do so.
2. Recommendation that the anti-coagulation policy is reviewed by both the ITU and haematology team specifically for patients who have APTT>180 seconds as the rare nature and risk factors require a comprehensive and thoughtful plan.
3. Review the education provided at orientation, and re-iterate to current RMOs of the need for timely handover of clinical information to the responsible consultant.
4. Update the Early Warning Score policy to reflect that in the case of on-going deterioration re-escalation needs to occur; and present this case to emphasise the expectation to nurses to escalate concerns when further deterioration occurs despite plans for a pending review.

The above remedial measures proposed in the DHB report is detailed, appropriate and adequate to address the above incident with [Mrs A] and with subsequent similar incidents in the future provided that the recommendations are rigorously and strictly adhered to.

3.10 Any other matters or issues identified in your review of the case that you consider warrant comment.

No other matters."

Further advice received from Dr Peter Gan on 9 October 2018

"If the abnormal APTT results had only been a day or at most two days and the patient bled, that can be considered bad luck as the effect of adjusting the heparin dose can take that long.

However to continue to do so almost several times a day for a few days would mean that the team was not thinking and blindly following protocol. In fact there was an investigation done after the bleed and one of the suggestions was to incorporate in the protocol to consult haematology when something like this happens in the future.

As a medical person should always have common sense and not blindly follow protocol and the patient suffered harm because of it, there is a departure from the standard of care. However, because the protocol was followed in this case, doggedly, I would consider it a slight departure as it is understandable in the climate of today's medicine which equates following protocols to patient safety.

Peter Gan"