

Auckland District Health Board

A Report by the Health and Disability Commissioner

(Case 18HDC01361)

Contents

Executive summary	1
Complaint and investigation	2
Information gathered during investigation.....	2
Opinion: Auckland District Health Board — breach.....	11
Opinion: Dr C — adverse comment.....	16
Recommendations.....	17
Follow-up actions	17
Appendix A: Independent advice to the Commissioner	18

Executive summary

1. This report concerns the postoperative care provided to a man following brain surgery at a private hospital in 2018. It highlights the importance of junior clinicians having adequate supervision, and clear communication between clinicians regarding patient care. Owing to postoperative complications, the man was transferred from the private hospital to a public hospital two days later and treated with a high dose of heparin. Early the next day, the man was found to be unresponsive, and a head scan indicated a large intracerebral haematoma¹ at the surgical site. Sadly, despite active treatment, the man passed away.
2. The Commissioner found that Auckland District Health Board (ADHB) failed to provide the man with an appropriate standard of care and breached Right 4(1) of the Code. The Commissioner was critical of the inadequate support and supervision for junior staff, and the inadequate communication from senior to junior clinicians regarding the man's treatment plan. In particular, staff errors and systems issues led to the man being given too high a dose of heparin, and inadequate communication led to the man's head scan not being triaged with the urgency it required. In addition, the Commissioner was critical of a neurosurgeon that when he handed over the man's care from the private hospital he did not communicate clearly enough to ADHB clinicians about whether the man's head scan needed to be done before starting heparin.
3. Since these events, ADHB has taken steps to improve its processes, including in relation to the administration of heparin, making priority selections for Radiology referrals, and accessing clinical support when needed.
4. The Commissioner made a number of recommendations to ADHB, including that it provide a written apology to the man's family, and update HDC on (1) its review of the process for requesting a Radiology scan and requiring clinicians to make a priority selection when submitting a Radiology referral; and (2) the development of a clear and agreed pathway to provide specialist input and support for complex patients in the neurosurgical High Dependency Unit. The Commissioner also recommended that ADHB undertake an audit of junior and senior clinicians in neurosurgical services to ensure that they fully understand the application of ADHB's heparin chart, and provide an update on any further relevant service improvements at ADHB.

¹ A mass of usually clotted blood that forms outside blood vessels.

Complaint and investigation

5. The Health and Disability Commissioner (HDC) received a complaint from Mrs B about the services provided by Auckland District Health Board to Mr A. The following issue was identified for investigation:
- *Whether Auckland District Health Board provided Mr A with an appropriate standard of care in 2018.*
6. The parties directly involved in the investigation were:
- | | |
|--------------------------------|-------------|
| Mrs B | Complainant |
| Auckland District Health Board | Provider |
7. Further information was received from:
- | | |
|-----------------------|------------------------|
| Private hospital | Provider |
| Dr C | Provider/neurosurgeon |
| Dr D | Provider/house officer |
| Dr E | Provider/house officer |
| Office of the Coroner | |
8. Also mentioned in this report:
- | | |
|------|-------------------------|
| Dr F | Neurosurgical registrar |
|------|-------------------------|
9. Independent expert advice was obtained from a neurosurgeon, Dr Peter Gan (Appendix A).
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Information gathered during investigation

Introduction

Mr A

10. Mr A, aged in his seventies at the time of these events, underwent a craniotomy² for debulking³ of a right temporal⁴ glioblastoma⁵ (brain tumour) at a private hospital. Mr A's medical history included hypertension and asthma. In 2017 he had had a left total hip replacement and a blood transfusion for associated postoperative bleeding.
11. Following his brain surgery on Day 1,⁶ Mr A developed a deep vein thrombosis⁷ (DVT) in his left arm, and on Day 3 he was transferred to the public hospital and administered a high

² Surgical opening of the skull.

³ The complete or partial removal of a tumour.

⁴ A lobe (part) of the brain.

⁵ A malignant and rapidly growing cancer in the brain.

⁶ Relevant dates are referred to as Days 1–5 to protect privacy.

dose of heparin.⁸ At 4.37am on Day 4, a CT head scan showed intracerebral bleeding, and Mr A died later that day.

ADHB policies and procedures

12. Since February 2017, ADHB had used a heparin infusion chart that documented two protocols for the administration of heparin — one for patients with a “High Bleeding Risk”, who receive a lower dose, and one for patients with a “High Thrombosis Risk”, who receive a higher dose. The chart noted a target APTT⁹ level of 50–80,¹⁰ and stated that if APTT reached 91–115, infusion should be stopped for 30 minutes and restarted at a lower rate.

Private hospital — Day 1 to Day 3

13. On Day 1, neurosurgeon Dr C performed the planned debulking of Mr A’s brain tumour at the private hospital. Postoperatively, Mr A was noted to be fully alert and orientated, with no neurological deficits or headaches.
14. Mr A’s APTT level the next morning was 23, and a repeat test was recommended. At 9.45pm, it was noted that Mr A’s left arm was swollen. An ultrasound performed on Day 3 revealed a DVT in that arm, which Dr C elected to treat with anticoagulation. He stated:

“I discussed with [Mr A’s] family that there was a risk of bleeding related to anticoagulation however, I felt that this was a reasonable option ... I felt it was safer for [Mr A] to be anti-coagulated at the public hospital in case there was a complication.”

15. At about 3.45pm, Dr C telephoned the neurosurgical registrar at the public hospital, Dr F, to discuss Mr A’s case. Dr C then documented his plan for Mr A to be transferred to the public hospital’s Neurosurgery High Dependency Unit (HDU) and for a “CT head [scan] ... no bolus heparin infusion” and to “consult thrombosis team on Monday”.
16. Dr C asked for the heparin to be administered without the initial dose that is typically given when patients are anticoagulated (known as the bolus), which he stated “allows the Heparin effect to come on in a slow and controllable fashion”.
17. ADHB stated that heparin is not used regularly in neurosurgery, and Dr C and neurosurgery clinicians generally did not know about ADHB’s heparin chart in place at the time, or that there was a high-dose protocol “that required a decision to be made” about the most appropriate heparin dose for Mr A. ADHB stated that Dr C and Dr F believed there was one lower dose heparin protocol that was used routinely on the neurosurgery ward, and that it would be used in Mr A’s case.

⁷ A blood clot within a deep vein that is potentially life-threatening if dislodgment results in obstruction of a blood vessel.

⁸ Anticoagulant (blood-thinning) medication.

⁹ Activated Partial Thromboplastin Time — a test that measures blood-clotting time in the context of heparin monitoring.

¹⁰ If the APTT is outside this range, a repeat test is to be done in 6 hours’ time.

18. ADHB further told HDC that it is not usual practice for senior medical officers (SMOs) to write heparin prescriptions, and that this is done by junior staff, and senior medical staff assume that junior staff are confident with prescribing heparin.
19. At 4.30pm on Day 3, Mr A was transferred to the public hospital for treatment of his DVT with heparin.

Public hospital — Day 3

20. Dr F conveyed Dr C's instructions to ADHB house officer Dr D, who recorded Mr A's management plan on admission as: "CT head ... Heparin infusion — no bolus ..."
21. Nursing staff also noted the same management plan: "1) CT — [head scan] 2) Heparin infusion."
22. At 9.50am on Day 4, Dr F documented retrospectively that the plan was to "start a no bolus heparin infusion, and get CT [head scan] ... monitor neurological status closely [and] monitor APTT as per protocol". He further noted that this plan was communicated to Dr D, nursing staff, and Mr A.
23. At about 5.40pm on Day 3, Mr A arrived on the HDU. Dr D documented retrospectively at 5.10pm on Day 4 that he then reviewed Mr A's medical record and began his medication chart, and that Dr F told him to "start heparin infusion no bolus and order CT Head".
24. In relation to the heparin infusion chart in place at the time of events, Dr D retrospectively documented:

"I have used this form approx. 15 times as a house officer at ADHB — both starting and changing infusion rates. This has been on Ortho, Urology, Gen Surg [and] potentially other wards. Never on neurosurgery I believe."

25. Dr D told HDC:

"As [Mr A] had a deep vein thrombosis, my interpretation was such that he was not just at high risk of thrombosis but indeed had one. Therefore, [High Thrombosis Risk] seemed the obvious protocol to choose at the time and did not prompt me to consult otherwise. ... I considered the protocol carefully. It stated that where there was a high risk of thrombosis the regime I prescribed should be used. That is why I followed it in this instance."

26. ADHB stated:

"[Mr A's] neurological state was assessed and was considered to be normal suggesting that there was no significant intracranial bleeding at the operative site to contraindicate commencement of the therapeutic heparin. ... The neurological monitoring was commenced after the initiation of the heparin protocol."

27. At around 6.30pm, Mr A's no-bolus heparin infusion for high-risk thrombosis was started at the higher dose of 1440 units per hour.

CT head scan

28. As noted above, Mr A had been transferred from the private hospital to the public hospital with the plan to obtain a head scan and administer heparin.
29. Dr D submitted the request for a CT head scan at 6.25pm, and noted: “[D]ay 2 post temporal lobe tumour resection developed left subclavian DVT needs post op imaging please.” At the time of events, clinicians were not required to select a priority level for a scan request to Radiology. The scan was triaged as semi-urgent (to be done within six hours), and subsequently scheduled for 10.30pm.
30. At 10pm, Dr D finished his shift and handed over Mr A’s care to the on-call night house officer, Dr E. Dr D asked Dr E to follow up with the head scan and check Mr A’s APTT at midnight, and adjust the heparin dose accordingly.
31. After handover, Mr A’s head scan, planned for 10.30pm, was cancelled, as the scanner was required for another patient with a higher clinical priority. In relation to the lack of a head scan prior to the commencement of heparin, ADHB stated:

“[I]n [Mr A’s] case, despite a CT scan being requested, it was not able to be performed owing to pressure on the Radiology Service ... [I]n addition to making the radiology referral, [Dr D] phoned the radiology service to advise them of why the scan was required. [Mr A] was sent to the scanner for a CT scan, but his scan was unable to be undertaken, as an emergency scan with higher clinical priority than [Mr A’s] took precedence.

In light of the unavailability of the CT scanner, the treating neurosurgical team balanced the risks of starting the heparin infusion without a CT scan against further deterioration in the patient’s condition. Given [Mr A] had been transferred to [the public hospital] from a private hospital for urgent treatment, further delays were considered to be potentially detrimental.”

32. Dr E documented retrospectively at 10.30am on Day 4 that Radiology told nursing staff that they would call with a rescheduled time for the CT scan.

Public hospital — Day 4

33. Dr E obtained Mr A’s APTT sample around 12am on Day 4, and his retrospective record of events noted that Mr A did not have a headache at that time. The blood results showed that Mr A’s APTT had increased to 100. Owing to this result, at 1.30am Dr E paused the heparin administration for 30 minutes, and then restarted it at a lower rate of 1340 units per hour, as per the heparin infusion chart protocol.
34. Dr E told HDC:

“Unbeknownst to me, [Mr A’s] initial [heparin] dose ... had been much higher than what was appropriate ... Therefore, even though I stopped the infusion for half an hour and reduced the subsequent dose appropriately, this did not effectively correct [the] initial error.”

35. The medication chart states that at 1.30am (the same time as the heparin infusion was paused), Mr A was administered 5mg of oxycodone,¹¹ but the reason why this was given is not documented, and there was no mention of a headache in the clinical records.
36. Dr E documented retrospectively at 10.30am on Day 4 that after noticing that Mr A had still not received a CT scan at 2am (when the heparin infusion was re-started), he asked a nurse to contact Radiology to obtain a time for the scan.
37. In his retrospective documentation, Dr E noted that Mr A had complained of a headache around 2.30am, although the Department of Critical Care Medicine (DCCM) admission note¹² records that the headache occurred at 3am. In addition, Dr E told HDC that when he stopped the heparin infusion at 1.30am, he was not informed by nursing staff at that time that Mr A “had in fact developed a headache”.
38. ADHB told HDC that it is unable to confirm the exact time when Mr A’s headache started.
39. Dr E told HDC:
- “[Mr A’s] mild headache did not fit the typical picture for an intracranial haemorrhage,¹³ which is usually a sudden, severe headache that is unremitting despite analgesia, often associated with focal neurology (such as limb weakness/facial asymmetry, nausea, vomiting, aphasia, vision changes, seizures) ... If [Mr A’s] headache was worsening despite analgesia ... or he developed ANY focal neurology I would have contacted the Neurosurgery Registrar [Dr F] immediately.”
40. The medication chart states that at 3.25am, a nurse administered Mr A another 5mg dose of oxycodone, but the nursing notes do not record the reason this was given, nor do contemporaneous clinical records state that Mr A had a headache at this time. By 3.25am, the head scan had still not been booked, and Dr E retrospectively recorded that at this time he again asked nursing staff to “chase up CT time”.
41. At 3.50am, nursing staff documented that a head scan had still not been arranged, and that they were “still waiting to be called” about the scan.
42. At 4.05am, nursing staff found Mr A to be unresponsive, and a Code Red¹⁴ was called. Medical staff were contacted to attend urgently. Mr A was intubated and administered intravenous protamine.¹⁵
43. At 4.19am, Dr E sent another request to Radiology for a head scan. The scan was performed at 4.37am and showed a large intracerebral haematoma¹⁶ at the surgical site.

¹¹ Opioid medication for the treatment of moderate to severe pain. ADHB told HDC that it is unable to identify from the signature on the chart who administered oxycodone at this time.

¹² Mr A was eventually transferred to DCCM (see paragraph 44).

¹³ Bleeding within the brain.

¹⁴ Medical emergency.

¹⁵ Protamine is used to counteract the anticoagulant effect of heparin if excessive bleeding occurs and when an overdose has been given inadvertently.

44. Mr A was administered protamine again at 5am, and at 5.15am he was transferred to theatre, where Dr C carried out an “evacuation of [the intracerebral bleed] under pressure”. Dr C documented retrospectively that at this time he noted that a high-dose heparin protocol had been given. At 5.45am, a blood test showed that Mr A’s APTT was 27. Mr A was transferred to DCCM postoperatively.
45. A repeat head scan at 9.31am showed that Mr A’s neurological condition had deteriorated further. After discussion with Mr A’s family, care was ceased, and Mr A passed away at 3.05pm.

Further information

46. Dr E told HDC:

“From what I recall, there was a major delay in the transfer of the patient’s notes from [the private hospital] to [the public hospital], which meant that at the time, I had no access to details about the patient’s recent surgery.”

47. In relation to Dr E’s recollection about the delay in transferring Mr A’s notes from the private hospital to the public hospital, ADHB told HDC that while usual practice is for notes to be transferred with patients, it cannot now confirm whether this occurred in Mr A’s case, or, if there was a delay in notes transfer, what the time delay was. ADHB stated:

“A verbal handover was completed to be able to establish initial care required. Acknowledging the challenge of not having the clinical records at the time of admission, the consultant would have been available to clarify by phone if further information was required.”

Heparin

48. ADHB’s root cause analysis (RCA) report noted that Mr A had an “atypical and clinically complex presentation” owing to the presence of a high bleeding risk and a left subclavian DVT. The RCA report stated that this presentation would have “required specific expertise to manage”, and that it is unknown whether the complexity of Mr A’s condition was discussed with Dr D during the handover process.
49. ADHB stated:

“The decision to anticoagulate a post-operative neurosurgical patient is always a difficult one because of the life threatening risk of potential haemorrhagic complications. In this case, the decision was a considered one as both the anaesthetist and surgeon noted that the patient’s left arm was severely swollen with a degree of vascular compromise and anticoagulation therapy was needed. Heparin was therefore the appropriate treatment.

...

¹⁶ A mass of usually clotted blood that forms outside blood vessels.

In this case the patient was post-operative and hence at a high risk of bleeding. However, he also had an acute thrombus. The wording of the two protocols at the time was 'Protocol 1 — High Bleeding Risk' and 'Protocol 2 — High Thrombosis Risk'. No further information on the chart was provided to guide the prescriber in making the choice as to which protocol was suitable for which demographic of patient. For this the prescriber needed to access a separate document, the Medicines Administration Guideline (MAG), via the intranet. In the case of this patient, based on the names of the protocols on the chart, either protocol could have been suitable. Had the MAG been consulted prior to the prescribing of the heparin infusion, staff involved may have identified that the patient should have received protocol 1 (high bleed risk)."

50. In relation to the MAG, ADHB noted:

"While it was intended that the MAG would also be consulted to provide more detailed advice for the type of patient appropriate for each protocol, the guidance provided on the [heparin] chart meant that it could be used without reference to the MAG with substantially abbreviated information on protocol choice. In addition the dose adjustments based on APTT were included, again bypassing the MAG."

51. Dr C stated:

"The higher dose [heparin] infusion should not be used after neurosurgery. [Mr A] was commenced on the high dose infusion at 1440 units per hour due to a charting error."

52. Dr D told HDC that at the time of Mr A's care he had not received any formal training in relation to ADHB's heparin protocol form or when to use each protocol. He further stated that at the time, he had had "little exposure to neurosurgery" or the management of postoperative neurosurgical patients.

53. ADHB told HDC that it believes that there is no direct relationship between the heparin dosing error and Mr A's outcome. It stated:

"While the heparin dosing may have contributed to the bleeding, the highest [APTT] was recorded at 100, which is not very far above the therapeutic range (50–80) ... [I]t is arguable that the bleed could have occurred even with a lower heparin dose and lower APTT."

CT head scan

54. ADHB's RCA report noted that the instructions stating the order in which the head scan and the heparin infusion should occur were not explicit, and that this, combined with the experience level of the junior house officer, resulted in the heparin infusion commencing prior to a baseline head scan being obtained. The report stated that the head scan should have been prioritised before the commencement of the heparin infusion, and that neither Dr C nor Dr F could recall whether their instructions were explicit enough during handover.

55. Dr D told HDC that he was not made aware of the urgency of the CT scan or the significance of its timing. He stated: “My direct instructions were to ‘please start heparin infusion — no bolus, and order CT Head’.”

56. In relation to who had responsibility for following up the timing of the CT scan that Mr A needed following the cancellation of his 10.30pm scan on Day 3, ADHB told HDC:

“While we work collaboratively as a team and it is reasonable to have asked the nurse to chase up the CT scan, ultimately it is the person requesting the scan that is responsible for ensuring the scan is completed as required.”

Consultation with Haematology Service

57. There is no evidence that the Haematology Service or other suitably experienced clinicians were consulted for advice concerning the dosage of heparin prior to its administration.

58. ADHB told HDC:

“There was no protocol in place for the service to contact the Haematology service for advice around the dosage of intravenous heparin and heparin protocol (as per the heparin chart) that was administered to [Mr A]. That protocol was developed with specialist input on appropriate heparin dosing from the Haematology Service. Consultation prior to the initial heparin dose had not been envisaged by [Dr C], who had asked for a consultation with the thrombosis service ‘on Monday’ (presumably when they were available). In most hospitals around NZ it is not the accepted practice for this type of clinical decision, on a weekend, to involve a referral to an on-call haematology or thrombosis service.”

59. ADHB’s RCA report noted:

“[T]he on call haematology registrar would have been available to provide advice. ... It is likely this would have resulted in use of heparin protocol 1 or possibly a lower dose ‘off protocol’ regimen. However the thrombosis service with nurse specialist and SMO staff with particular experience in this area are not available out of hours. ... The patient may still have bled on this heparin dose, so it is unclear if this would have resulted in a different outcome.”

Changes made since these events

60. As a result of these events, ADHB made the following changes:

- The heparin infusion chart was updated and the high-dose protocol was removed to eliminate the need for precise instructions regarding the use of high- or low-dose protocols. The chart contains instructions in four steps, including:
 - i. Step 1 — Record the weight and baseline APTT for all patients.
 - ii. Step 2 — “Is Specialist input needed?” The chart advises that heparin therapy in the context of either neurosurgical patients, and recent or ongoing haemorrhage,

must be discussed with Haematology and the responsible SMO/registrar before initiating treatment.

iii. Step 3 — “Is a loading dose needed?” The chart advises that loading doses are not routine and should not be used for patients who are less than five days post-surgery or have had recent intracranial bleeding.

iv. Step 4 — “Continuous infusion prescription.” The chart advises to commence heparin infusion at 12 units/kg/hour. A dosing reference table provides guidance for selecting the correct dose; the highest dose is 1200 units per hour, for people who are 100kg or over.

v. In addition to the above four steps, the chart also contains the following:

- The provision for an “off protocol heparin prescription”, which states: “This section is only to be used on advice of Haematology or an SMO.”
 - Guidance for intervention when minor, major, or life-threatening bleeding is present.
- The Haematology Service presented to senior neurosurgical clinicians, who were made aware of the current heparin protocols and changes to the chart.
 - The neurological and thrombosis services have developed a flowchart designed specifically to guide staff on when Haematology involvement is required in the context of heparin treatment. The flowchart states:
 - i. If the patient has also had a new diagnosis of DVT, Haematology should first be contacted for advice.
 - ii. If the patient does not have a diagnosis of DVT (and therefore is not in need of initial Haematology consultation) but is postoperative, a CT scan should first be carried out before other assessments or treatments. The flowchart states that if the CT scan and subsequent bloods are concerning, the registrar should escalate to Haematology or an SMO for a patient-specific plan.
 - A review is underway to change the process for when a clinician requests a Radiology examination or scan, such that it will be mandatory for clinicians to make a priority selection when submitting a Radiology referral.
 - A review is underway to consider how perioperative medical support is provided to patients in surgical specialities, including Neurosurgery. The review is expected to be completed in 2020.

61. ADHB stated that it believes the changes to the heparin chart will make the chance of human error during prescription of heparin less likely to occur, and that the risk of a similar event occurring in neurosurgical services is low following the implementation of its recommendations.

62. ADHB further stated that currently the DCCM and Neurology Service are working together to develop a clear and agreed pathway for intensivists to provide specialist input and support to complex patients in the neurosurgical HDU. ADHB told HDC:

“A model has been developed whereby direct contact, discussion and care planning takes place between the [SMOs] from DCCM and neurosurgery. The ultimate model of care is for an extra Fellow to be employed by DCCM ... The responsibilities of the Fellow would include [being] the single point of contact for the neurosurgical medical staff (House Officers, Registrars, SMOs) for patient care issues that are non-neurosurgical in nature.”

Responses to provisional opinion

63. Mrs B, ADHB, and Dr C were given the opportunity to respond to relevant sections of my provisional opinion. Parts of the report have been changed where relevant.
64. ADHB accepted my provisional findings. It further submitted that while heparin dosing may have contributed to Mr A’s intracerebral bleeding, it does not believe there was a causal relationship between the heparin prescribing, the intracerebral bleeding, and Mr A’s poor clinical outcome. ADHB also said that it provided relevant sections of the provisional opinion to Dr F, Dr D, and Dr E. Only Dr D provided a response, and he accepted the findings.
65. Mr A’s family said that it accepts Dr C’s decision to commence anticoagulation therapy postoperatively; however, it questioned ADHB’s belief that there is no direct relationship between the heparin dosing error and Mr A’s outcome.
66. Dr C had no further comment.

Opinion: Auckland District Health Board — breach

Introduction

67. ADHB is responsible for the services it provides, and must ensure that appropriate systems are in place to support clinicians to carry out their roles and enable optimal outcomes for patients. At the time of these events, ADHB had not informed its neurosurgical clinicians about the heparin chart in use, which meant that those clinicians were not in a position to guide junior staff, including house officers Dr D and Dr E, about which heparin protocol to prescribe in the complex situation of a post-neurosurgical DVT. Further aspects of the care provided to Mr A, including in relation to his CT scan, also affected his care pathway in a detrimental way. I consider that in this case, the care provided to Mr A could and should have been better, in particular through clearer staff communication and by ensuring that clinicians were aware of relevant service policies and applied them appropriately.

Responsibility of junior doctors

68. After neurosurgical registrar Dr F communicated the treatment plan for Mr A to house officer Dr D on the afternoon of Day 3, Dr D (and later Dr E on the night shift) managed Mr A’s care. In relation to the overall responsibility of these junior doctors regarding the care Mr A received, my expert advisor, neurosurgeon Dr Peter Gan, advised:

“Any reasonably experienced doctor would be concerned about an intracerebral bleed especially after major intracranial surgery. However, as the two junior doctors on that day and night cannot be said to be experienced doctors, it is unfair to put the blame fully on them. It is likely the result of poor communication between the neurosurgery department with the junior staff on call and also the lack of insight on the part of the junior doctors concerning their lack of clinical experience.”

69. I accept this advice and consider that although Dr D and Dr E had important roles in Mr A’s care on Day 3 and Day 4, as already noted ADHB has ultimate responsibility. It is important that ADHB, and senior clinicians, provide adequate support to junior doctors to ensure that decisions being made about patient care are robust and correct. This included ensuring that there was clear and explicit communication from the more senior clinicians, Dr C and Dr F, to Dr D regarding Mr A’s treatment plan. The suboptimal systems in place to support, supervise, and communicate with junior staff affected the care subsequently provided to Mr A.

Public hospital

High dose of heparin

70. Mr A was at high risk of intracerebral bleeding owing to his recent craniotomy, and that risk increased when he later required anticoagulation for his significant DVT. When transferring Mr A to the public hospital, Dr C assumed that Mr A would be prescribed a lower dose of heparin, as Dr C believed there was only one heparin protocol used on the Neurosurgery Ward, and he was unaware that ADHB had two heparin protocols. The wording of the two ADHB heparin protocols was “High Bleeding Risk” and “High Thrombosis Risk”, and no other information was available on the chart to guide the prescriber, Dr D, in making the choice about which protocol to use for Mr A. As Mr A already had a DVT, and senior clinicians did not specify which protocol to choose, Dr D believed it was appropriate to select the high-dose heparin protocol for “High Thrombosis Risk”. After Mr A was commenced on heparin, he received neurological monitoring. However, subsequently Mr A suffered intracerebral bleeding and died.
71. Dr D said that at the time he had not received any formal training in relation to the heparin protocol chart or when to use each protocol, and noted his lack of experience in the management of postoperative neurosurgical patients.
72. ADHB stated that usually prescriptions for heparin are carried out by junior staff, and for that reason senior neurosurgery clinicians did not know about the heparin protocol chart.
73. My expert, Dr Gan, advised that Mr A was started on the wrong heparin protocol, and that the protocol was chosen by “the least experienced clinician there to decide” (house officer Dr D).
74. Dr Gan noted that there was a lack of clarity and information around which heparin protocol to choose. There was no information on the chart to guide Dr D in making the choice as to which protocol was suitable, other than the names of each protocol, which were for high risk of either “bleeding” (lower dose) or “thrombosis” (higher dose). Dr Gan

said that this would have contributed to Dr D selecting the higher dose, and that owing to this, ADHB shares responsibility for Mr A being given the high heparin dose.

75. Dr Gan further advised that junior doctors such as Dr D should “always be supervised closely” because they have the least amount of experience among medical staff, and it cannot be assumed that they have the “essential clinical knowledge”.
76. Notwithstanding ADHB’s comment about the reason senior neurosurgery clinicians did not know about the heparin chart, I am critical that ADHB had not taken steps to inform its neurosurgery clinicians about the heparin chart around the time it was implemented — over a year prior to these events — particularly in light of the bleeding risks associated with post-neurosurgery patients and the increased risk when anticoagulation is then required postoperatively. If ADHB had made its neurosurgery clinicians aware of the heparin chart, then Dr C and Dr F could have considered the most appropriate protocol for Mr A and explicitly instructed Dr D that a lower dose protocol was necessary in Mr A’s case.
77. In relation to Dr D’s decision to choose the “High Thrombosis Risk” protocol and the higher heparin dose, I note his level of experience as a house officer and with managing postoperative neurosurgical patients, and that he was not provided with formal training regarding use of the heparin chart. Dr D could have sought guidance from more senior clinicians for confirmation on the correct heparin dose to prescribe in light of the significant risk of bleeding, and it is unfortunate that he did not do so. However, there was insufficient guidance on the heparin chart around which of the two protocols to choose. In addition, Dr D should not have been placed in this difficult situation owing to the fact that senior neurosurgery clinicians did not know about the chart. I accept my expert’s advice that junior doctors should be supervised closely, and that therefore Dr D’s decision in the circumstances as a junior doctor is understandable. ADHB is responsible for ensuring an appropriate level of supervision for its junior staff, and for providing adequate training on clinical matters where junior staff may be expected to make decisions without supervision. I am critical that neither of these occurred in this case.

CT head scan

78. It appears from the clinical documentation of Dr C, Dr D, and nursing staff that initially the plan was for Mr A to have a CT head scan, followed by commencement of a heparin infusion. ADHB noted, however, that the instructions stating the order in which the head scan and the heparin infusion should occur were not explicit, and Dr D stated that he was instructed by his senior, Dr F, to “start heparin infusion — no bolus, and order CT head”. The CT scan request was made at 6.25pm (around the time, or shortly before, the heparin infusion started), and was triaged as semi-urgent. However, it was not carried out until 4.37am the next day, and about two hours after Mr A had complained of a headache.
79. ADHB acknowledged that the head scan should have occurred before the heparin was started. However, it noted that given the unavailability of the CT scanner, and having balanced the risks of starting heparin without a CT scan against further deterioration of Mr A’s condition, the treating team decided that it was safer to commence heparin, as not

doing so could have been potentially detrimental, considering that Mr A had been transferred for urgent treatment.

80. Dr Gan advised:

“[Mr A’s] CT scan should have been treated as urgent and done before starting the intravenous heparin because if the scan showed a haematoma or residual tumour left in the tumour cavity, that would alert the treating team and the starting heparin dose would in all likelihood be reduced.”

81. Dr Gan advised that the failure to carry out a CT head scan prior to commencing heparin and when Mr A was “neurologically intact” was a mild departure from the standard of care.

82. Dr Gan further stated, however, that when Mr A started complaining of a headache, the CT scan should then have been prioritised with urgency. Dr Gan advised:

“This is because there is a definite change in the symptomatology of the patient. A headache that persisted in a patient on IV heparin has to be taken seriously especially since the patient has no headaches before. This is even the case when analgesia given helps the headaches.”

83. Dr Gan advised that the failure to carry out a CT scan urgently in these circumstances when Mr A began complaining of a headache is a moderate departure from accepted practice.

84. I am mindful that ADHB clinicians found themselves in a position of having to treat a deteriorating postoperative neurosurgery patient urgently owing to a DVT, with instructions that could have been more explicit in relation to the order assessments and treatment should be carried out. In addition, Mr A’s CT scan, planned for 10.30pm on Day 3, was cancelled because a patient with a higher clinical priority needed the scanner at that time. However, I note that the CT scan had been triaged only as semi-urgent, which appears to be in part owing to the fact that clinicians were not required to select a priority level for a scan request to Radiology, which I find to be inappropriate in these circumstances. I agree with Dr Gan and ADHB that Mr A’s situation was in fact urgent; the sooner he received a CT scan, the sooner necessary steps could have been taken to adjust his heparin dosage and operate on his intracerebral haematoma. I accept my expert’s advice that when Mr A’s presentation changed with the development of a headache, adequate steps were not taken to ensure that the CT scan was prioritised appropriately and carried out at that time. This failure may have at least in part stemmed from the earlier inadequate communications from senior neurosurgery clinicians to junior staff regarding the precise interventions that Mr A required, and when precisely they should have occurred.

85. In light of these factors, I consider that there should have been better systems in place for coordination and decision-making to ensure that Mr A’s scan was treated with the urgency it required, particularly when he developed a headache. It appears that ADHB’s lack of

requirement for clinicians to select a priority level for scans was a key contributing factor to the delay in obtaining Mr A's CT scan. I am critical of this omission. I note that ADHB is now considering making it mandatory for clinicians to select a priority level when submitting a Radiology referral.

Conclusion

86. I am critical that the care provided to Mr A placed him at increased risk of a poor outcome. In particular:
- There was inadequate support, supervision, and communication from senior to junior clinicians regarding Mr A's treatment plan.
 - Mr A was administered a high dose of heparin primarily because:
 - i. Senior clinicians did not know about the heparin protocol chart and so were not in a position to provide guidance to junior clinicians about which protocol to prescribe; and
 - ii. There was insufficient guidance on the heparin chart to support junior staff with prescribing the correct protocol.
 - Mr A's CT scan was not triaged with the urgency it required when the referral was sent through to Radiology.
 - When Mr A later complained of a headache, the CT scan was not prioritised urgently.
87. Accordingly, I find that ADHB failed to provide Mr A with an appropriate standard of care and breached Right 4(1) of the Code of Health and Disability Services Consumers' Rights.¹⁷

Other comment

Consultation with Haematology

88. ADHB stated that its heparin protocols were developed with input from the Haematology Service, and at the time of these events ADHB did not have a policy guiding staff to consult with Haematology around heparin dosage. Dr C did not request that ADHB clinicians consult with Haematology when he transferred Mr A's care to the public hospital, and recommended only to "consult thrombosis team on Monday". ADHB stated that while the on-call Haematology registrar would have been available to provide advice about heparin dosage on the day of Mr A's admission to the public hospital, it is not accepted practice for decisions about heparin dosage at the weekend to involve a referral to Haematology or the thrombosis service.
89. Dr Gan advised that postoperative haematoma after starting heparin is well known in Neurosurgery and is not uncommon. He said that in Mr A's case, and following a cranial operation to debulk a glioblastoma with likely residual tumour left behind, "the risk of a post-operative haematoma ... would be high".

¹⁷ Right 4(1) states: "Every consumer has the right to have services provided with reasonable care and skill."

90. Dr Gan further noted that while most hospitals around New Zealand do not have an on-call Haematology Service, and it is therefore not standard practice to involve Haematology for decisions around anticoagulant dosage, “there [are] usually medical physicians on-call such as cardiologists (that are well experienced in using anticoagulants) that would have been able to provide some advice”. Dr Gan advised that when it is not possible to obtain any advice from Haematology or medical physicians, it would be appropriate to commence anticoagulant administration cautiously, e.g., starting heparin at a half dose.
91. Dr Gan advised that although at the time of these events there was no protocol in place to consult with the Haematology team for advice concerning the dosage of heparin, it would have been good clinical practice to do so. Dr Gan believes that overall, the failure to seek appropriate advice prior to the administration of heparin was a moderate departure from the standard of care.
92. It is clear that it was not standard practice for clinicians to consult with Haematology prior to commencing heparin, nor was there any expectation from Dr C or ADHB in this case that Haematology would have been contacted for advice when Mr A was admitted to the public hospital. Nevertheless, I consider that it would have been beneficial to have sought advice prior to the commencement of heparin, and I note that ADHB has since developed guidelines to inform clinicians when Haematology involvement is required.
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Opinion: Dr C — adverse comment

Transfer of care from the private hospital to the public hospital

93. Mr A was transferred from the private hospital to the public hospital after a DVT was found in his left arm. Dr C communicated his plan for Mr A to have a CT head scan and a heparin infusion with no bolus. Dr C was unaware that ADHB had two protocols for heparin infusion, and so did not specify which protocol should be followed.
94. My expert advisor, neurosurgeon Dr Peter Gan, advised that Dr C’s response to Mr A’s arm swelling was appropriate and timely, and that it was appropriate to transfer Mr A to the public hospital for management of his DVT owing to the availability of greater clinical resources there at the time of care.
95. Dr Gan also advised, however, that in his opinion the communication between Dr C and the on-call team at ADHB, comprising neurosurgical registrar Dr F and house officer Dr D, was unclear and likely contributed to the subsequent events in Mr A’s care. Dr Gan said:

“The registrar was told to get a CT scan of the head and start intravenous heparin without giving the bolus dose. This was then conveyed to the house officer. It is unclear from the instructions whether the CT Head should be done first before starting heparin or sometime during the day. Firm and clear instructions should be made by the SMO to the on-call team so that there would be no doubt what the management plan was.”

96. I accept that Dr C's response to Mr A's arm swelling, and the decision to transfer Mr A to the public hospital for management of his DVT, was appropriate and timely. However, I consider that Dr C's instructions to ADHB clinicians regarding whether the CT head scan needed to be done before starting the heparin should have been clearer.
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Recommendations

97. I recommend that ADHB:
- a) Provide an update, within four months of the date of this report, on its review of:
 - i. The process for requesting a Radiology examination or scan, and requiring clinicians to make a priority selection when submitting a Radiology referral.
 - ii. How perioperative clinical support is provided to patients in surgical specialties, including Neurosurgery.
 - b) Undertake an audit of junior and senior clinicians in neurosurgical services to ensure that they fully understand the application of the updated heparin infusion chart, and that staff are aware of, and can access, the flowchart designed to guide them on when to seek Haematology involvement in the context of heparin treatment. ADHB is to report the results of these audits to HDC within four months of the date of this report.
 - c) Provide an update on the development of a clear and agreed pathway to provide specialist input and support for complex patients in the neurosurgical HDU, within four months of the date of this report.
 - d) Provide an update on any further relevant changes and service improvements at ADHB, within four months of the date of this report.
 - e) Provide a written apology to Mr A's family. The apology is to be sent to HDC within one month of the date of this report, for forwarding.
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Follow-up actions

98. A copy of this report will be sent to the Coroner.
99. A copy of this report with details identifying the parties removed, except ADHB and the expert who advised on this case, will be sent to the Health Quality & Safety Commission, and the Royal Australasian College of Surgeons, and placed on the Health and Disability Commissioner website, www.hdc.org.nz, for educational purposes.

Appendix A: Independent advice to the Commissioner

The following expert advice was obtained from neurologist Dr Peter Gan:

“1. INTRODUCTION

1.1 This report is based upon case note review of [Mr A] provided by HDC on the 18 April 2019:-

- Letter of instruction from HDC with questions dated 18 April 2019
- Letter of Complaint [...]
- Auckland DHB’s response dated 11 March [2019]
- Auckland DHB’s Root Cause Analysis Report dated [2019]
- Photocopied clinical records from Auckland DHB from [2018]
- Investigations:
 1. Report of CT Head dated [prior to surgery]
 2. Report of CT Head dated [Day 4]
 3. Report of CT Head dated [Day 4]
 4. Report of CT Post Mortem Head dated [Day 5] 0524 hours
 5. Report of CT Post Mortem Whole Body dated [Day 5]

2. CIRCUMSTANCES OF THE INCIDENT

2.1 [Mr A] had multiple significant medical history such as hypertension and asthma. He had a TURP in 2010, a bioprosthetic aortic valve replacement in 2016 with a dual chamber pacemaker for symptomatic brachycardia and ventricular standstill and a left total hip replacement in 2017. He suffered from postoperative bleeding requiring blood transfusion after the hip surgery.

2.2 [Mr A] had a right temporal glioma debulked in [the private hospital] by [Dr C] on [Day 1]. He did well after surgery and was fully alert, orientated and had no focal neurological deficit and no headaches.

2.3 It was then noticed on the first postoperative day, that he developed swelling of his left hand extending to above the left elbow with the skin being a red/blue appearance.

2.4 Ultrasound done on [Day 3] showed a thrombosis in the left brachial vein extending to the left brachiocephalic vein. He was then transferred urgently to the high dependency unit (HDU) in Neurosurgical department in [the public hospital] for treatment of the left subclavian vein thrombosis.

2.5 Instructions were given from [Dr C] to the neurosurgical registrar on-call in [the public hospital] to do a CT scan of the head and to start intravenous heparin but to

omit the initial bolus dose. The on-call neurosurgical registrar then informed the on-call house officer and conveyed the instructions from [Dr C]. These instructions were documented by the house officer in the initial clinical record of the patient upon admission to the hospital.

2.6 At that time of his admission to HDU at 1740 pm, the neurosurgical registrar was attending to an urgent patient in the neurosurgical ward. He was seen by the house officer and at 1800 pm was seen by the neurosurgical registrar.

2.7 On admission there was some confusion from the house officer concerning blood results. The house officer thought that the blood results were from admission whereas they were from [the private hospital].

2.8 He was started on high dose heparin at 1440 units per hour at 1830 pm. There were two dosage regimes and the higher one was chosen and instituted by the house officer. It was unclear whether the house officer had spoken to the neurosurgical registrar about this. The haematology team was not contacted.

2.9 The CT scan of the brain was not done before the heparin was started as the CT scanner was busy scanning other acute patients and he was not prioritised as urgent as he was stable and well. The CT Head was scheduled for 2230 hours but was postponed.

2.10 The night duty officer then came on and the day house officer handed over the patient's care to him/her.

The night duty house officer was asked to chase up the CT scan of the head and to check the APTT of the patient.

2.11 The intravenous heparin was checked as per protocol and found that the APTT was too high at 100 at 0122 am [Day 4]. The heparin was stopped for 30 minutes and was restarted at 1340units per hour as per protocol at 0200am. A dose of oxycodone 5mg was given at 0130am presumably for headaches.

2.12 The patient complained of headache at 0300am and was given oxycodone 5mg at 0325am. At 0405am, his neurological condition deteriorated and dropped his GCS to 9. The neurosurgical registrar and house officer were contacted urgently.

2.13 The neurosurgical registrar arrived and noted his GCS was 6 (E1V2M3) with right pupil 4mm and unreactive and left pupil 3mm and sluggish. He was intubated, and IV Protamine was given at 0430 am. An urgent CT Head at 0438 am showed a big intracerebral haematoma in the cavity of the operative site.

2.14 Another dose of IV Protamine 50 mg was again given at 0500 am. He was taken to theatre at 0525 am and the clot was evacuated.

2.15 After surgery he was admitted to ITU. At 0850 am he was noted by the neurosurgical registrar to have dilated pupils with decreased reactivity.

2.16 Repeat CT Head at 0936 showed progression of oedema and progressive hydrocephalus. After discussion with the family, care was withdrawn, and he passed away on 1505 pm [Day 4].

13. ANSWERS TO QUESTIONS

13.1 Whether you considered [Dr C's] response to [Mr A's] arm swelling was appropriate and timely.

In my opinion, [Dr C's] response to [Mr A's] arm swelling was appropriate and timely. When the left arm swelling occurred, it was first monitored and when it worsened, an ultrasound was done which diagnosed left subclavian vein thrombosis. It was also the right decision to transfer the patient to [the public hospital] for management of this condition as in [the private hospital], there is a lack of manpower especially during the weekends.

13.2 In its Root Cause Analysis Report, the DHB has outlined several factors which may have contributed to the patient's poor outcome. If the factual findings in the report are accepted, do you consider any of these factors represent a departure from the accepted practice (taking into account any related factors you deemed as relevant) and if so, to what degree (mild, moderate, severe). In particular:

- **Do you consider there should have been a consultation with the haematology service regarding the heparin dosing? If so when should that have occurred?**

Although there was no protocol in place to contact the haematology team for their advice concerning the dosage of intravenous heparin, it would have been good clinical practice to do so as it would have likely avoided this scenario of the patient being started on high dose heparin that is used for thrombolysing clots rather than the lower dose to treat a venous thrombosis. This is especially so in a post-operative patient who had a cranial operation to debulk a glioblastoma with likely residual tumour left behind as the risk of a post-operative haematoma in this case would be high. The fact the haematology team was not contacted, in my opinion, was below the standard of care and in my opinion represents a moderate departure from the standard of care.

- **Should the CT scan have been treated as urgent?**

In my opinion, the CT Scan should have been treated as urgent and done before starting intravenous heparin because if the scan showed a haematoma or residual tumour left in the tumour cavity, that would alert the treating team and the starting heparin dose would in all likelihood be reduced.

The fact was that the CT scan was not done prior to starting the intravenous heparin and in fact it was delayed until the patient deteriorated. The excuse given was that the scanner was busy scanning other urgent patients and the patient was stable with no

symptoms and that must be balanced with the fact that the venous thrombosis in the arm had to be treated. However, there was no record in the notes that the neurosurgical registrar or house officer spoke to the radiology team on-call to prioritise the patient for the scan.

The fact that the CT was not done before starting intravenous heparin with the patient being well and neurologically intact, in my opinion, represented a mild departure from the standard of care for this patient. But when the patient was complaining of increasing headaches requiring more frequent doses of analgesia and still the CT scan was not prioritised represented a moderate departure from the standard of care for this patient.

• **Was [Mr A] commenced on the correct heparin protocol? If not, who was responsible for that decision?**

[Mr A] was definitely commenced on the wrong heparin protocol, which was a high dose. Apparently, [Dr C] did not know that there were two heparin protocols available when he gave the instructions to start intravenous heparin without the bolus dose.

The protocol was chosen by the house officer, the least experienced clinician there to decide. The fact that there were two different dosages of the intravenous heparin also did not cause the house officer to hesitate and question the dosage, he just went with the higher dose without asking anyone as there was no indication that he had asked the on call neurosurgical registrar or [Dr C] concerning the heparin protocol to start on. If he had, the responsibility would have lain with either the neurosurgical registrar or [Dr C]. As he made the decision himself, the responsibility lies with him. However, as there was a lack of clarity and information on which heparin protocol to choose which would have contributed to the house officer selecting the higher dose, the responsibility should also be shared by the hospital as well. This represents a moderate departure from the standard of care.

13.3 Do you identify any additional factors not covered in the Root Cause Analysis Report which you feel may have contributed to the patient's poor outcome and/or which represents a departure from accepted practice? If so, can you quantify the departure from accepted practice (mild, moderate, severe).

The Root Cause Analysis Report was sufficiently comprehensive and detailed, looking at all relevant factors. I could not identify any additional factors not covered by this report.

13.4 Are the remedial actions outlined in the DHB's Root Cause Analysis report appropriate, and do you have any further recommendations related to this case?

In my opinion, the remedial actions in the DHB's Root Cause Analysis report were appropriate. I have no further recommendations to add.

13.5 Are there any other matters in this case that you consider warrant comment.

In my opinion, the communication between the admitting consultant and the on-call team which comprises of the neurosurgical registrar and house officer seemed to be confusing and unclear which likely contributed to the situation. The registrar was told to get a CT scan of the head and start intravenous heparin without giving the bolus dose. This was then conveyed to the house officer. It was unclear from the instructions whether the CT Head should be done first before starting heparin or sometime during the day. Firm and clear instructions should be made by the SMO to the on-call team so that there would be no doubt what the management plan was.

Yours sincerely,

Peter Gan,
Consultant Neurosurgeon”

Dr Gan provided the following further expert advice on 1 December 2019:

“1. INTRODUCTION

1.1 This supplementary report is based upon further documents provided by the HDC on the 15 November 2019:-

- Email of instruction from [HDC] dated 15 November 2019
- Auckland DHB’s response which included statements from [Dr D] and [Dr C] dated 26 August 2019
- Auckland DHB’s response dated 5 November 2019
- Response form [Dr E] dated 30 September 2019.

RESPONSES TO AUCKLAND DHB

13.1 Mistakes highlighted in the Auckland DHB’s response dated 26 August 2019.

First of all, I wish to apologise for the mistakes in my report as highlighted in their responses. The second error is purely a typing error as in my previous report of 16 May 2019, under ‘Circumstances of the Incident’, under paragraph 2.5, I have already highlighted the fact that [Dr C’s] instructions would be to start intravenous heparin without the bolus dose.

13.2 In the Auckland DHB’s response on the 26 August 2019, it was implied that there is no direct relationship between the intravenous heparin and the intracerebral bleed because of [Mr A’s] prognosis.

In response I would say that intravenous heparin or any anticoagulant for that matter is well known to cause intracerebral bleeds.¹ In fact, the risk of post-operative

¹ Ray B, Keyrouz SG. Management of anticoagulant-related intracranial hemorrhage: an evidence-based review. Critical Care. 2014 Jun;18(3):223.

intracerebral haematoma is so high that some neurosurgeons throughout the world would not start any sort of anticoagulant for DVT prophylaxis after surgery. On top of that, there are many cases of post-operative haematoma that a practising neurosurgeon would remember and regret of after starting heparin or any form of anticoagulant.

It must be remembered that [Mr A] had the first surgery on [Day 1] and was fully alert, orientated and had no focal neurological deficit and no headaches after surgery. He then developed a large post-operative clot after the heparin which started in the tumour cavity and dropped his Glasgow coma scale after that. Despite surgery to evacuate the clot, he subsequently passed away.

[Mr A] definitely had a good clinical outcome after the first intracranial surgery with no neurological deficit and fully orientated. I would argue that the subsequent 'poor clinical outcome' of death is directly due to the post-operative bleed as a result of starting high dose heparin rather than the natural progression of the disease.

13.3 It was also disputed by Auckland DHB that the Haematology service should be contacted at that time the heparin was started.

Whilst I agree that in most hospitals in New Zealand, there is no on-call haematology service (something that ideally would need to be changed), there is usually medical physicians on-call such as cardiologists (that are well experienced in using anticoagulants) that would have been able to provide some advice. Failing that which is very unlikely, then erring on the side of caution would be warranted by i.e. starting the heparin at half the dose or switching to low molecular subcutaneous heparin.

13.4 It was also disputed by Auckland DHB that the CT scan of the brain was not delayed inappropriately.

As argued in my previous report, it should be treated as an urgent investigation yet it is a mild departure from the standard of care as the patient was well without any headaches or neurological deficit. However, once the patient started having headaches that were persistent, oxycodone was given at 0130 am and 0325 am for headaches and [that] the patient was not pushed urgently for a scan remains a moderate departure from the standard of care.

This is because there is a definite change in the symptomatology of the patient. **A headache that persisted in a patient on IV heparin has to be taken seriously especially since the patient has no headaches before. This is even the case when analgesia given helps the headaches.** If the patient had the scan earlier when he developed the headaches, the vast likelihood is that the clot would be smaller at that time and the heparin was stopped and surgery would likely save his life with no or minimal neurological deficit.

13.5 Concerning the two statements by the house officers.

It must be remembered that they are the most junior of doctors with the least amount of experience and looking at their statements, that does not change my opinion. To assume that they would have the essential clinical knowledge in this current day and age is foolish. They should always be supervised closely.

13.6 The second Auckland DHB's report suggested that my previous report was unduly influenced by hindsight.

Unfortunately, a report after the death of a patient is always going to be influenced by hindsight. My method for compiling a report would be to look at the facts then looking at published medical evidence and my practice and my colleagues' practices to come up with a reasonable standard of care. Unfortunately, postoperative haematoma after starting heparin is well known in neurosurgical circles throughout the world [and] that this scenario is not uncommon at all.

Yours sincerely,

Peter Gan,
Consultant Neurosurgeon."

Dr Gan provided the following further expert advice on 3 March 2020:

"As explained, it is a moderate departure from accepted practice because [Mr A's] APTT was so high that they had to stop the heparin infusion and he began to complain of headaches. Any reasonably experienced doctor would be concerned about an intracerebral bleed especially after major intracranial surgery.

However, as the two junior doctors on that day and night cannot be said to be experienced doctors, it is unfair to put the blame fully on them. It is likely the result of poor communication between the neurosurgery department with the junior staff on call and also the lack of insight on the part of the junior doctors concerning their lack of clinical experience (otherwise the wrong dose of heparin would not have been started by one of them without asking for advice).

Peter Gan"