Obstetrician, Dr B

A Public Hospital

A Report by the

Health and Disability Commissioner

(Case 00HDC12227)

Health and Disability Commissioner
Te Toihau Hauora, Hauātanga

Parties involved

Mr A	Complainant
Mrs A (deceased)	Consumer
Dr B	Provider / Obstetrician
Dr C	Provider / Medical Registrar
Dr D	Provider / Cardiology Registrar
Dr E	Provider / Clinical Director Medical Services
Ms F	Provider / Nurse
Ms G	Provider / Nurse
Dr H	Gynaecologist and Fertility Specialist
Dr I	Cardiologist
Dr J	Cardiologist
Professor K	Obstetrician and Gynaecologist
Dr L	Cardiology Registrar
Dr M	Forensic Pathologist
Dr N	Radiologist
Mr O	Consumer's father
Mrs O	Consumer's mother

Complaint

On 28 November 2000 the Commissioner received a complaint from Mr A about the services provided to his late wife, Mrs A, by Dr B and Cardiology Services at a public hospital. Mr A's complaint was summarised as follows:

Dr B

- *Mrs A understood that the estimated date of her delivery (EDD) was 15 July 2000. Dr B and Mrs A agreed that if she went past the EDD labour would be induced or she would have a Caesarean section. Dr B admitted Mrs A for induction of labour on 7 July 2000 and the baby was born by Caesarean section the following day. Dr B delivered the baby a week before he should have done and the Caesarean section may not have been necessary.*

Cardiology Services of the public hospital

- *On 14 July 2000 Mrs A was admitted to the public hospital following a bout of chest pain. Her cardiac enzyme levels indicated that she had had a heart attack. She was treated for angina. The public hospital did not follow up her possible heart attack and did not recognise the serious nature of her illness.*
- *On 18 July 2000 Mrs A's treadmill test indicated that something was seriously wrong with her heart. The public hospital decided to send her to another public hospital for an angiogram. Mrs A died at 4.00am on 20 July 2000 before she was transferred to*

the second public hospital. The first public hospital should have transferred Mrs A to the second public hospital on 18 July 2000 following the treadmill test.
- *The first public hospital did not closely monitor Mrs A following her admission to hospital.*
- *The first public hospital did not explain the seriousness of Mrs A's condition or the danger that she was in to Mrs or Mr A.*

An investigation was commenced in relation to Dr B and the first public hospital on 23 January 2001. The investigation was extended to include individual providers at the first public hospital on 16 August (Dr C, Dr D and Dr E) and 5 December 2001 (Ms F and Ms G).

Information reviewed

- Mrs A's medical records from Dr B and the first public hospital
- Report and medical records from gynaecologist and fertility specialist Dr H
- Reports from cardiologists Dr I and Dr J
- Report for Coroner by Professor K, obstetrician and gynaecologist
- Additional information supplied by Dr L, cardiology registrar at the second public hospital, and forensic pathologist Dr M
- Report for Commissioner by an independent obstetrician and gynaecologist, Dr Michael East
- Report for Commissioner by an independent cardiologist, Dr David McHaffie

Information gathered during investigation

Obstetric care – Dr B
Mr and Mrs A attended gynaecologist and infertility specialist Dr H in September 1997. Mrs A had previously had two unsuccessful cycles of artificial insemination. On 18 October 1999 Mrs A had an insemination. Dr H's notes indicate that Mrs A had her last menstrual period ("LMP") on 8 October and a sperm injection on 18 October 1999. When her pregnancy was confirmed by ultrasound Dr H estimated her delivery date ("EDD") as 15 July 2000. Dr H recalled that he calculated this using the standard formula from the date Mrs A's last period commenced. Dr H advised that if the EDD had been calculated from the insemination date it could have been brought forward to about 10 July. Dr H is not an obstetrician and when he saw Mrs A on 29 November they discussed who would be her lead maternity carer. Dr H noted that it was decided Mrs A would continue her obstetric care with his colleague, Dr B. Dr B advised me that Dr H's referral was verbal rather than written.

Mrs A consulted Dr B for the first time on 6 December 1999. Mr A advised me that he and his wife had an agreement with Dr B that if Mrs A went beyond her EDD, labour would be induced and, if necessary, she would be delivered by Caesarean section ("LSCS"). Dr B told them that the EDD was 14 July 2000.

Dr B has delivered many women with fertility problems. It is his standard practice to offer women an induction at or close to term to minimise the risk of tragic outcomes. Mrs A was 36, this was her first baby, and she had conceived using donor sperm insemination. Therefore, it was clear to him that this was an "extremely precious pregnancy" as she might not have another opportunity to conceive.

Dr B said that at the first consultation, Mrs A informed him that her LMP was 24 September 1999 and he recorded this in her notes. Dr B acknowledged that he incorrectly recorded the date of her insemination as 8 October 1999 instead of 18 October 1999. He used 8 October 1999 and ultrasound scan dates to determine her EDD and post-date status. By his calculation Mrs A's EDD was 1 July 2000. Dr B advised me and the Coroner that Mrs A's EDD was 1 July. Mr A said that Dr B told Mrs A the EDD was 14 July.

Mrs A had a number of ultrasound scans during her pregnancy and each estimated the EDD. Her scan reports indicated the following:

On 17 December 1999 EDD 11 July 2000.
On 24 December 1999 EDD 10 July 2000.
On 23 February 2000 (at 20 weeks) EDD 1 July 2000, revised the first ultrasound EDD.
On 20 April 2000 (at 28 weeks) confirmed the EDD 1 July 2000.
The radiologist for these four scans was Dr N.
On 20 June 2000 (at 38 weeks) EDD 1 July 2000. This ultrasound report noted the change in dates and indicated:

> "EDD 11-7-00 by early scans at 10 and 11.5 weeks 1-7-00 by later scans …
>
> Normal appearances. Growth satisfactory for dates of 38 weeks passed on LMP scan (AC on 50th centile for 38 weeks). EDD 1-7-00. Dates were changed around 20 weeks. I have taken these dates for my data."

The sonographer was Ms ….

Dr B recorded that Mrs A's LMP was 24 September 1999 and EDD 11 July. (Mr A said that Dr B told him and his wife about the initial 11 July EDD.) The EDD was changed in Mrs A's clinical records to 1 July 2000. Dr B determined that, if it was necessary to induce labour, induction should occur on or about 8 July when Mrs A would have been at term plus seven days. Dr B advised me that he did not question the changed EDD, estimated by the 23 February scan, because the difference in EDD was a matter of days rather than weeks.

Mr A recalled that at the consultation on 23 February Dr B told Mrs A that the EDD had changed to 1 July. They asked how the dates can change and Dr B told them that it was

because of the LMP and scan reports. Mr A said that at the last two visits to Dr B he reaffirmed that Mrs A would be induced if she went over time. When Mrs A had not gone into labour on 7 July, there was a discussion about admission to the first public hospital. Mr A said that it was not until they went to see Dr B at the last consultation that he told them Mrs A was overdue and he would induce her before the weekend.

Mr A believes that Dr B's miscalculation of the EDD set in train a series of events that led to his wife's death. Mr A considers that Dr B should have realised the mistake in the EDD and corrected for this. He questions whether the change in the EDD was a typographical error. Dr N advised me that the change in EDD could have been a typographical error. The EDD can be based on either the first day of the LMP or the size of the baby based on ultrasound measurements of the baby's femur, head and abdomen. It is an estimate and only 4% of babies will be born that day. EDD is used in the later stages of pregnancy to help correlate whether the baby is normal, small or large in size for dates. Whether the last menstrual period EDD or the ultrasound EDD is used to determine the actual date of delivery is a complex and variable issue. It depends on the accuracy of the LMP, the length of the woman's menstrual cycle (average is 28 days), when ovulation occurred, the accuracy of ultrasound measurements, the difference between the LMP EDD and the ultrasound EDD, and how far into the pregnancy the woman is when the ultrasound is taken.

Dr N explained that at conception all babies are uniform in size (the size of a few cells). However, by term, 40 weeks, there are large discrepancies in "normal size", from 2.8 to 4.4kg. The ultrasound uses the size to correlate the "age". A baby at the later stages of pregnancy will have a wider range of possible ages based on its size. Earlier scans are more "accurate" in estimating age in the sense that there is less natural variation in size. However, at 12 weeks' gestation the variation in calculated age can be plus or minus one week, making the baby's age 11 or 13 weeks, and an EDD uncertainty of seven days. By 20 weeks the variation can be plus or minus 10 days, and at 28 to 40 weeks the variation can be as much as two or three weeks. As far as Dr N could tell, Mrs A's dates were based on ultrasound measurements. Her baby was of average size for an EDD of 1 July, and "largish" for an EDD of 11 July. Dr N concluded that "the babe was still in the normal range for size for both these EDD".

Mr A said that he did not believe there had been a change in the EDD because this was a donor conception. Dr B told them that he was going overseas on holiday on 14 July, and Mr A learned later that Dr B left the country on 16 July. In his view Dr B induced his wife early to fit in with holiday plans.

Dr B denied going overseas on holiday. He had a short holiday in July 2001, but would not have induced Mrs A to "fit in" with his personal plans, as he had no need to. There were three other obstetricians at the clinic and each covered for one another. In Mrs A's case he would have referred her to another obstetrician if her delivery date coincided with his holiday plans.

Delivery

Dr B advised me that Mrs A had an excellent pregnancy and he saw her 13 times. He discussed the possibility of an induction with Mr and Mrs A and believed that they fully

understood what to expect. Dr B believed induction on 7 July was the most desirable option for her for the following reasons:

"1. On the evidence of dates and scans I believed her to be post-dates.
2. This was her first pregnancy.
3. She was 36 years of age.
4. Significant history of infertility.
5. As at 7 July 2000 the baby's head was still high and had not entered the pelvis.
6. [Mrs A] was in extreme discomfort. The induction was started on 7 July 2000 at 7pm."

Dr B described Mrs A as a woman of small stature with a relatively large baby and towards the end of her pregnancy was feeling uncomfortable. Mr A denied that his wife was extremely uncomfortable. He believed that she was enjoying her pregnancy.

Mrs A's parents, Mr and Mrs O, had arranged to fly to New Zealand from their home overseas to be with their daughter for the birth of the baby. Their daughter told them the EDD was around the middle of July and Mrs O arranged to take his holidays then. He had five weeks' annual leave and they arranged to fly to New Zealand arriving in early July 2000. Their daughter did not tell them the scan reported a change in EDD. They received regular written communications from their daughter during the term of her pregnancy. Mrs A telephoned them every Sunday because of the cheap telephone rates from New Zealand. She had long telephone conversations with her mother. Mrs O said that her daughter never complained of feeling "extremely uncomfortable", but was simply suffering the normal feelings of discomfort at the end of her pregnancy.

Dr B started the induction on 7 July at 7.00pm with a priming dose of prostaglandin, which was meant to ripen the cervix so that the induction would continue the following day. However, without further inducement Mrs A went into labour soon after the prostaglandin was inserted. Her membranes ruptured spontaneously at 9.30pm. By 2.00am she was in strong established labour, contracting every two to three minutes.

The baby's head remained high and, by 11.00am (8 July), when attempts at vaginal delivery had failed, Mr and Mrs A agreed to a Caesarean section. Dr B advised me that the decision to perform the LSCS was made on factors other than that Mrs A was overdue. She was fully dilated but the baby's head had not descended into the pelvis after significant pushing, and extra caution was needed.

The baby was born at 1.20pm on 8 July. Mrs A was discharged home with the baby on 13 July 2000.

Cardiac admission to the first public hospital

At 2.00am on 14 July 2000 Mrs A awoke with chest pain. Mr A notified a housecall service and a doctor attended soon after. The doctor placed Mrs A on oxygen, gave her aspirin and two doses of nitrolingual spray (used to relieve cardiac pain), called the ambulance and arranged for her to go immediately to the first public hospital.

At the first public hospital medical registrar Dr C examined Mrs A at about 5.00am. Dr C noted that Mrs A was four days post-partum following a Caesarean section and had woken at 2.00am with chest pain. Mrs A described her pain as like a "tight band around her chest" and "like a heavy weight". Mrs A was short of breath, felt hot and cold, and had vomited once. Her pain had lasted about an hour and resolved without medication. Dr C noted that Mrs A had no prior history of chest pain. Mrs A told her that she had had some swelling of her ankles at the time of her delivery but no calf pain. Mrs A's blood pressure was elevated, and she reported that it had been elevated once or twice during her pregnancy. She did not know her cholesterol level and reported that she had an uncle who had a myocardial infarction (heart attack) at 38. Dr C described Mrs A as comfortable, pain free and well at the time of the examination, blood pressure 180/95, heart rate 60 and oxygen saturation 98% on room air. Mrs A's venous pressure was normal, chest clear and abdomen soft. On examining Mrs A's legs Dr C found "mild oedema" still present and her pulses were palpable. Her electrocardiograph ("ECG") showed normal rhythm with the occasional additional beat but no ischaemic changes. She had a chest x-ray which was normal.

Dr C was uncertain what caused Mrs A's chest pain but recorded that it sounded "very like ischaemic in nature", despite the low risk factors. Dr C thought Mrs A had unstable angina but could not exclude the possibility that she may have had a pulmonary embolism (clot in the pulmonary artery). Dr C recommended that the pain be treated as angina (cardiac pain) in the first instance. She decided to admit Mrs A to the acute assessment ward ("AAW") for cardiac monitoring under a medical consultant. Dr C ordered serial enzymes tests, fasting blood cholesterol and continuous cardiac recordings. Dr C decided that if Mrs A's enzyme test results were abnormal she should be transferred to the coronary care unit ("CCU"). Dr C prescribed aspirin but, given Mrs A's recent delivery and Caesarean section, decided to withhold Clexane (medication used to prevent clotting) for the time being. She asked for a single room for Mrs A because she was breast-feeding.

Mrs A arrived at AAW at about 6.00am. The nurse noted that Mrs A had had aspirin earlier (order by her general practitioner) and did not repeat the dose ordered by Dr C. She noted Dr C's requirement to transfer Mrs A to CCU if her enzyme tests were abnormal. The cardiac enzyme results became available at 6.25am and, in light of the Troponin 1 result of 4.05 (normal less than 0.1), the nurse notified Dr C, who transferred Mrs A to CCU. Mrs A was admitted to CCU at 7.25am.

Dr C advised me that the initial treatment for unstable angina is the same as for myocardial infarction (heart attack) without ECG changes. Therefore, the treatment that she instituted covered either condition. She was fully aware of the significance of the elevated cardiac enzyme, which was why she arranged Mrs A's transfer to CCU for close monitoring and ongoing specialist cardiology care.

The Clinical Director Medical Services, Dr E, reviewed Mrs A in CCU during the morning ward round at 7.25am. He noted Mrs A's elevated enzymes, absence of cardiac murmur and normal ECG. Dr E advised me that the elevated enzyme levels did not necessarily indicate a heart attack. Raised Troponin levels are indicative of heart muscle injury, which may have a number of causes. The most likely causes in Mrs A's circumstances were heart

attack or pulmonary embolism. Dr E documented that he doubted Mrs A had had a significant pulmonary embolism but he could not explain the elevated cardiac enzyme result. He ordered continuous observation and cardiac monitoring while he organised further investigations. He also prescribed a single dose of Clexane.

Dr D was the cardiology registrar. Dr D first became aware of Mrs A on the morning of 14 July when the ward pharmacist asked him whether it was safe for Mrs A to have Clexane while she was breast-feeding. Dr D discussed this with Mrs A and she decided to refrain from breast-feeding for the next 48 hours. However, she wanted to continue breast-feeding when she went home and decided to express and discard her breast milk every four hours to maintain lactation.

Mrs A's nursing records indicate that she had "pressure between shoulder blades" during the morning, which was improved by GTW (nitrolingual spray). Later that day Mrs A again experienced pain between her shoulder blades and back similar to the pain she had experienced at 8.30am. This was relieved when she lay on her side. She had Panadol for abdominal pain. Mrs A slept for three hours and was feeling much better on waking. Mrs A's afternoon report indicates that she had no further chest pain but her surgical incision (from the Caesarean section) was uncomfortable and the pain was relieved with Panadol.

Dr B saw Mrs A later that day and ordered removal of her surgical clips (from the LSCS surgery) the following day. Mrs A's electrolyte results were discussed with the house surgeon, who commenced potassium supplements for a low potassium level. Mrs A continued to express breast milk every four hours. Her ECG tracings were normal. At 10.00pm the nursing report noted that Mrs A had had no chest pain. Her blood pressure was 150/90 and her ECG was normal. Mrs A settled without any sedation and requested that she be woken at 1.30am to express again. She had no chest pain during the night but received Panadol for surgical pain. Her cardiac monitoring was normal and blood pressure 133/67. She expressed breast milk twice during the night.

At 10.30am on 15 July Dr E reviewed Mrs A. He noted that she had last reported chest discomfort the morning before and was feeling very well. On examination Mrs A's pulse rate was 55, blood pressure 140/70, with no elevation in venous pressure, her chest was clear and her heart rate was normal with no murmur. Her cardiac enzymes remained elevated, CK 285 (< 4.0) and Troponin 1 16.45, and she had blood taken for further blood tests. Dr E still could not explain the elevated enzyme levels but did not think that there was sufficient evidence of myocardial ischaemia (lack of oxygen to the heart muscle). Until the time of her transfer her cardiac monitor recorded normal rhythm. Dr E stopped the Clexane and transferred Mrs A to another ward. He suggested that Mrs A have a treadmill test in two weeks. For the rest of the day Mrs A was up walking around the ward.

Dr E advised me that Mrs A was closely monitored for her first 48 hours in hospital. As she had no signs of cardiac instability she was transferred to the ward and not kept on a monitor. This is standard practice in all New Zealand hospitals. During the time in the ward, Mrs A was mobilising like any other patient and was expressing milk for her baby at regular intervals. Understandably Mrs A was very keen to return home but was prevailed upon to remain in the hospital pending the exercise tolerance test.

A midwife visited Mrs A on 15 July to remove the clips from her surgical wound. The cardiac nurse gave Mrs A pamphlets on angina and discussed its symptoms and causes. The nurse explained the importance of staying in hospital for another few days for observation. During the afternoon Mrs A was independent and she continued to express breast milk.

At 9.00pm on 15 July Mrs A's pulse rate was slightly irregular but the ECG tracing remained in sinus rhythm. The cardiac nurse noted T-wave depletion in lead 3 and notified the on-call house surgeon. After examining Mrs A, the on-call house surgeon restarted Clexane, ordered arterial blood gas analysis, and notified Dr D. Dr D ordered check cardiac enzymes and blood electrolytes for 6.00am the following morning and noted that Dr E was to review Mrs A later in the day, by which time the test results would be available. Mrs A's abdominal wound, which had been clean with a good union when the clips were removed, was gaping slightly.

During the day on Sunday 16 July, Mrs A suffered no chest pain. She continued to express breast milk and had Panadol for surgical pain. Her ECG was normal, and she was independent. Mrs A's nursing records indicate that at 3.30pm, a registered nurse and Dr E discussed whether the Clexane should be continued. Mrs A had experienced three episodes of diarrhoea and this was discussed with the on-call house surgeon. The registered nurse noted that Mrs A asked for an explanation about her condition, as she wanted to return home to her husband and baby. The registered nurse and Mrs A discussed the option of having the baby stay with her but she was unwilling to have the baby in hospital. Mrs A was to have an ECG recording and arterial blood gas analysis taken the following morning. The arterial blood gas analysis was to eliminate the possibility of pulmonary embolism. During the night Mrs A had no chest pain.

On 17 July, during the ward round, Mrs A was reviewed by the medical registrar for Dr E's team. It was decided to discontinue Clexane if the arterial blood gases were normal. Mrs A was to have two investigations in an attempt to identify the cause of her symptoms: an exercise tolerance test ("ETT") and a CT pulmonary angiogram. The doctor who performed the pulmonary angiogram later that day reported that the study was normal with no evidence of clots. Mrs A requested that, if she was to have the ETT the following day, it be organised early as she was keen to go home. Mrs A reported no chest pain that day. The hospital pharmacist asked for a review of Mrs A's Clexane and potassium supplement. The on-call house surgeon continued Mrs A's Clexane and discontinued the potassium. Mrs A's blood cholesterol was elevated and she was seen by the dietician.

On 18 July Dr E reviewed Mrs A during his ward round. A cardiologist performed the ETT later that day. It showed significant ST depression after two minutes and the cardiologist stopped the test after five minutes. Mrs A had no symptoms throughout the test. The cardiologist reported the following:

> "[Mrs A] was able to exercise for 5 minutes of the Bruce protocol before the test was terminated because of the development of marked ST depression. At the time of terminating the exercise the heart rate was approximately 180bpm.

> The electrocardiograms during exercise showed the development of gross ST depressions, which reached a maximum depth of almost 5mm at the time that the exercise was terminated.
>
> Conclusion:
>
> Exercise tolerance was not limited by chest pain, but the electrocardiograms during exercise showed the development of marked ST depression – strongly suggestive of very important coronary artery disease. Further cardiological investigation (including coronary angiography) are almost certainly indicated."

Dr E reviewed the ETT tracings and asked Dr D to speak with the second public hospital's cardiologist about angiography. Dr D telephoned the cardiologist, Dr L, at the second public hospital immediately.

Dr E recalled that when he reviewed Mrs A on the morning of 18 July she had had no further chest discomfort and was up and about. However, the ETT was strongly positive for myocardial ischaemia. Mr A believes that his wife should have been transferred immediately to the second public hospital for the angiogram and wonders how Dr E could assess Mrs A's cardiac risk if he did not know the cause of her symptoms and had not made a diagnosis. Dr E advised me that the urgency with which a patient is placed on the coronary catheter theatre list for angiography depends on the stability of the patient's condition. Although Dr E knew that the ETT revealed significant coronary disease, and that her condition was potentially serious, he considered her sudden death unlikely. Dr E explained to Mrs A the need for angiography, and the possible diagnosis.

Booking system at the second public hospital

Dr L was the cardiologist on duty that day at the second public hospital and received Dr D's telephone call. Dr L could not recall her conversation with Dr D, probably because he called while she was in the operating theatre.

Usual practice at the second public hospital was for referrals for angiography to be clinically prioritised by a cardiologist. Where a referral is received from another hospital about an in-patient, the referring doctor will contact the cardiologist on call to discuss the clinical prioritisation. The cardiologist will then confirm with the booking clerk the patient's prioritisation and the patient will be booked onto the next available catheter list. The hospital has a full-time booking clerk dedicated to scheduling catheter procedures. The referring hospital will then fax a booking form, containing pertinent patient details, to the booking clerk. Dr L said that it was her usual practice to note clinical details at the time but discard the note after notifying the booking clerk. Dr L indicated that it is quite clear from Mrs A's medical records, recorded by Dr D, that she (Dr L) agreed that Mrs A required angiography and she should remain in hospital until the results were known. It is also clear that Dr D faxed the booking form and spoke directly to the booking clerk. Mrs A's medical records indicate that she was booked for a coronary angiogram at 8.30am on Thursday 20 July.

Dr D advised me that he pressed the second public hospital for an urgent angiography appointment because Mrs A had a new baby, was attempting to establish breast-feeding and wanted to go home. It was these reasons, rather than her cardiac status, that motivated him.

Dr E advised me that the urgency with which coronary angiography is sought is determined by the perceived instability of the patient. Patients who are thought for clinical reasons to be threatening a heart attack within the next few hours are sent for coronary angiography immediately. Patients with unstable angina or possible unstable angina who have no ongoing pain and are mobilising in the ward are discussed with the second public hospital and prioritised within the group of patients waiting at other hospitals in the Auckland region. Mrs A came within the second category and her appointment for 20 July was appropriate.

Continuing care

Mrs A's nursing records for the evening of Tuesday 18 July 2000 indicate that she had no chest pain and that her observations were within normal limits. Arrangements were confirmed for Mrs A to travel to the second public hospital for coronary angiography on Thursday 20 July at 8.00am. A transit care nurse would accompany Mrs A, and the ambulance was to be booked the following morning. Mrs A was comfortable and settled.

Mrs A's records indicate that she woke at 1.30am because she was worried about taking Clexane so close to having her angiogram. The nurse on duty was Ms G. Ms G contacted CCU, who advised her to give the 1.30am dose. At 6.00am, after Mrs A had expressed her milk, she told Ms G that she was experiencing left breast pain. Mrs A described the pain as breast pain rather than chest pain. Ms G recorded the following in Mrs A's notes:

> "0600. After expressing 0200hrs experienced L) breast pain. Felt more breast than chest pain. GTN spray x2 and cabbage leaf onto breast – settled. Fine this morning. Eager to get angiogram done."

Ms G gave Mrs A two doses of nitrolingual spray. She used nitrolingual spray "on the off chance that the pain was cardiac in origin and even though she had two doses, this gave her no relief". Ms G advised me that if nitrolingual spray is administered to a patient with chest pain related to heart disease, some degree of relief normally occurs within a short period of time. It was only after the cabbage leaf was applied to Mrs A's breast that she felt comfortable. Ms G therefore believed that Mrs A's pain was more likely to be related to lactation than her heart. Mrs A settled and experienced no further pain during that shift. Ms G did not take an ECG recording. Dr D expressed some doubt about whether an ECG at that time would have shown any changes.

On 19 July Mrs A had no chest pain. Ms F was the nurse caring for Mrs A during the evening. It was arranged that Mrs A would fast from midnight, and an ambulance would take her to the second public hospital at 7.30am. She was commenced on a heparin infusion in preparation for the angiogram. Ms F recorded that the heparin infusion was to be renewed at 11.45pm. Mrs A did not complain of any chest pain but had generalised body

aches and pains, which were relieved with paracetamol. Ms F noted that blood for coagulation studies was to be taken at 3.45am.

Mrs A's death
Mrs A's nursing records indicate that after her heparin infusion was renewed at 11.45pm she appeared to sleep until 3.40am. When the night nurse went to take the blood at 3.45am she found Mrs A was not breathing and had no pulse. The night nurse called the emergency resuscitation team. Attempts to resuscitate Mrs A were unsuccessful.

Mrs A's autopsy report, completed by forensic pathologist Dr M, showed that she had suffered a myocardial infarct secondary to a spontaneous dissection of the right coronary artery. Professor K provided the Coroner with an obstetric opinion. Professor K's report included the following findings:

"…

There seems to be some confusion as to the exact length of gestation and the expected date of delivery which is surprising since:

(a) the date(s) of insemination were known

(b) the ultrasound scan undertaken on 24 December 1999 was equivalent to a gestation of approximately 11 weeks and 4 days. The expected date of delivery would be approximately 10 July 2000.

7. An early scan is the most reliable estimate of the due date.

8. However I do not believe this miscalculation was a material factor in the death of [Mrs A].

9. Labour was induced starting 7 July which would have been a few days before the expected date. It is common to arrange induction about this time for pregnancies at added risk. The age of the patient; the history of infertility; and the very high position of the baby's head in relation to the mother's pelvis, all contribute to this added risk.

10. In any event the induction process progressed very satisfactorily so that [Mrs A] was fully dilated some 16 hours after the process was started.

11. Insufficient descent of the baby's head had occurred and the correct decision to deliver by Caesarean section was made.

12. In terms of 'stress' to [Mrs A's] physiology, the induction process was no more of a burden than if labour had started spontaneously.

13. In fact, the first stages of labour (that is, before the patient begins pushing) generate very little change in pulse rate, blood pressure or cardiac output.

14. The process of induction and subsequent labour and Caesarean section would not have placed undue pressure in the patient's heart.

15. Caesarean section, if complicated by blood loss, changes in blood pressure or infection, may affect heart function but:

    (a) There was no evidence of any of the above

    (b) [Mrs A] would very likely have come to Caesarean section irrespective of the induction. A 36 year old patient having her first baby, with a history of infertility and with the baby's head failing to engage in the pelvis, the chance of requiring Caesarean delivery would exceed 60%

…"

Professor K indicated that he has been an obstetrician for more than 30 years but Mrs A was the first patient that he is aware of who died of coronary aneurysm related to delivery.

Review of cardiology services

Dr E advised me that Mrs A's death affected all staff at the first public hospital, particularly those who looked after her during her pregnancy and following the baby's birth. For this reason, Dr E requested an internal review of her clinical management from cardiologists Dr I and Dr J. I have reviewed copies of both reports.

Dr I noted that Mrs A's primary pathology of spontaneous dissection of the right coronary artery was a recognised complication of pregnancy. It is most unusual and exceedingly difficult to treat. He commented that it is very unusual for a woman of Mrs A's age to develop myocardial ischaemia. Her admission ECG was normal and did not involve any changes over the course of her hospital stay. She was treated appropriately as unstable angina from the time she was admitted to hospital. For someone with unstable angina her high-risk feature was an elevated Troponin. Her low risk features were the rapid resolution of initial chest pain prior to admission, lack of definite ongoing symptoms, and lack of ST depression on the ECG. It is routine for patients such as Mrs A who settle on medical therapy and undergo a satisfactory ETT to be discharged home on day five. Mrs A had an ETT on day five and because it was strongly positive she was appropriately retained in hospital for in-patient angiography. Dr I speculated that Mrs A's cardiac arrest would have been detected earlier and treated successfully if she had been on a cardiac monitor. However, she did not have significant high-risk features to mandate such monitoring. Many patients with similar risk profiles are managed in a similar fashion every day. Dr I would not have requested continuous monitoring in Mrs A's case. In his opinion, the management of Mrs A was entirely appropriate throughout.

Dr J noted that Mrs A presented with clinical features of unstable angina. Coronary disease is very unusual in women in their thirties in the absence of major risk factors. The initial management of anti-platelet and anti-thrombotic therapy (aspirin and Clexane) was standard for this condition. Mrs A had few symptoms after her initial presentation and most of her ECG recordings were normal. A tracing showed some abnormality (though non-specific

findings) and was reviewed by the house surgeon on 15 July. Dr J also noted the T-Wave inversion and elevated Troponin 1 levels and markedly abnormal ETT. He commented that the abnormal ETT put her in a higher risk group for other cardiac events. The plan for inpatient cardiography was entirely appropriate in these circumstances.

Dr J agreed that Mrs A might have been successfully resuscitated if she had had ECG monitoring throughout her hospital stay. However, the current standard of clinical practice is to monitor patients within the first few days of having a myocardial infarction, and those with symptomatic unstable angina. Monitoring all patients with a presenting diagnosis of unstable angina throughout their hospital stay, including those without ongoing chest pain, is not standard practice anywhere in New Zealand, and would require a considerable change in resource allocation. Other anti-anginal medications might have been administered to Mrs A but there is little evidence that such medications alter the natural course of the condition. Medications with evidence-based efficiency, such as aspirin and heparin, were used appropriately.

In summary, Dr J concluded that the management of Mrs A during her stay at the first public hospital was consistent with current standards of clinical practice, and her subsequent autopsy demonstrated that she did not have coronary artery disease but rather the much rarer condition of spontaneous coronary artery dissection. This affects women more than men, often at a younger age, and may occur in those post-partum. It can be diagnosed by coronary angiography. The natural history of this condition is even less predicable than other coronary disease.

Independent advice to Commissioner

Obstetric advice
The following expert advice was obtained from Dr Michael East, an independent gynaecologist and obstetrician:

> "I have been asked to give an opinion regarding [whether] the standard of treatment delivered to [Mrs A] by [Dr B] was reasonable, particularly pertaining to induction of labour and caesarean section between the 7 and 8 July 2000. I have been supplied with the following documents –
>
> - [Mr A's] letter to the Commissioner marked 'A'.
> - The Commissioner's investigation letter to [Dr B] marked 'B'.
> - [Dr B's] response to the Commissioner marked 'C'.
> - [Mrs A's] medical records from [Dr B] and the first public hospital marked 'D'.
>
> **COMPLAINT MADE**
>
> That [Dr B] induced labour the week before he should have done and that the caesarean section performed may not have been necessary.

OPINION REQUESTED

1. As to whether [Dr B's] intention to induce [Mrs A] post EDD followed a standard practice.
2. Whether a miscalculation of the EDD led to an induction at an inappropriate time, thus affecting an obstetric risk.

OPINION

I would like to start by making the point that [Mr A] has two main areas of grievance. Firstly, pertaining to the estimated date of delivery and therefore a subsequent timing of induced labour and, secondly, to the management his wife received after entering the first public hospital complaining of chest pain.

It is my intention to concentrate solely on the first aspect of [Mr A's] complaint pertaining to the EDD and induction of labour as I am not qualified to comment on the [first public hospital's] management. Given the cause of death, however, I think it is highly unlikely that the obstetric management affected the health of [Mrs A] to the point where she would develop a dissecting aneurysm of the right coronary artery. It would be my view that this would be precipitated by labour at any stage whether the labour was induced or not.

It is beholden upon all obstetric caregivers to try one's best to determine the accuracy of EDD predictions. This is a priority at the first booking visit to a practitioner's rooms. There are certainly conflicting stories between [Mr A's] statement and the clinical records and the statement of [Dr B]. [Dr B] states that he was told by [Mrs A] that her last menstrual period was 24 September 1999 and yet the EDD of 11 July 2000 was decided upon in the notes. If one uses an obstetric calendar to calculate out the EDD from 24 September 1999 it works out to be 1 July 2000. There is clearly discrepancy here and it should have been noted at the time that either the LMP or the EDD was incorrect as they do not match.

The evidence cited by [Dr B] regarding the information used to calculate the EDD was first of all the booking visit where I point out that a discrepancy existed. Secondly, an ultrasound scan at twenty weeks' gestation revising the EDD to 1 July 2000. An ultrasound scan at this gestation has an accuracy of plus or minus ten days thus one would not automatically believe the ultrasound scan EDD without re-examining the LMP and artificial insemination evidence. The third point that [Dr B] makes in terms of determining the EDD relates to a 28-week scan at which time the plus or minus margin of error of scanning would be up to two weeks and finally the fourth point made is that the scan at 38 weeks' gestation also confirmed the EDD as 1 July but at this point a scan would have a plus or minus margin of error of up to three weeks or more. It may be helpful if correspondence between [Dr B] and [Mrs A's] GP could be found as this may detail the LMP and EDD and DI dates in type form rather than handwritten form. It also may be of interest to access [Dr H's] records to determine the date of DI and EDD given by [Dr H].

My opinion regarding the decision to induce at labour at the presumed 41-weeks by [Dr B's] revised dates would be within international guidelines although the trend has moved towards term plus 10-12 days post EDD but one could not criticise 41 weeks' gestation. Undoubtedly, however, induction of labour leads to an increased risk of Caesarean section but this had been discussed with [Mr and Mrs A]. Whether the appropriate EDD was used to determine 41 weeks is in doubt.

SUMMARY

I am unable from the contradictory evidence given to me to determine whether or not at the first ante natal visit made by [Mrs A] to [Dr B's] rooms as to the accuracy of the LMP, the EDD and artificial insemination dates given. It would seem that an error may well have been made at this time and then compounded by the typing error in the 20-week scan. Certainly when one works out from the 20-week scan the EDD the typing should have read 15.7.00 and not 1.7.00. The radiology unit therefore must also share the blame for the EDD confusion.

Irrespective of the EDD confusion I do not feel that the decision to induce labour was a deciding factor following [Mrs A's] fatal dissection of the right coronary artery. If the EDD was in error then the decision to induce labour would certainly have prejudiced the obstetric outcome by increasing the risk of Caesarean section. One cannot say, however, that (even if the labour had started spontaneously) that a vaginal delivery would have occurred as exactly the same outcome (failure of the head to descend in the second stage of labour) could still have occurred."

Dr East further advised:

"Thank you for forwarding onto me [Dr H's] letter regarding the LMP dating and eventual EDD calculation.

It is certainly clear from [Dr H's] letter that [Dr B] made an error in calculating the EDD. It was compounded by the fact that the ultrasound scan performed on 23.2.2002 had a misprint regarding the EDD date, which should have read 15.7.2000 and not 1.7.2000. This resulted in the plan to induce labour early. I do not believe such would have contributed to the death of [Mrs A] but I am still at a loss to explain how [Dr B] felt that the LMP given by [Mrs A] was 24 September as information available to him from [Dr H] would have stated clearly that the LMP was 8 October with insemination of sperm performed on 18 October."

Cardiology advice

I obtained the following expert advice from independent cardiologist Dr David McHaffie:

"Following your request for advice to assist the Health and Disability Commissioner form an opinion as to whether [Mrs A] received services with reasonable care and skill from cardiology staff at [the first public hospital], I have reviewed all the materials that you and [Dr M] had sent to me. My report is enclosed.

[Mrs A] died from the complications of myocardial infarction (heart attack), almost certainly from an unexpected change in heart rhythm that produced cardiac arrest. In her case the underlying cause for heart attack was a very rare disorder known as spontaneous coronary artery dissection. The post-mortem examination showed that this condition was caused by a tear in the wall of her right coronary artery and had interfered with the blood supply to her heart muscle, causing tissue scarring. This is a disorder that is recognised to be associated with pregnancy. It is usually not diagnosed at the onset of the illness and failure to detect it does not constitute a poor standard of care and skill.

I am satisfied that the cardiology staff at [the first public hospital] made reasonable diagnostic and management decisions. They considered important pulmonary conditions such as pulmonary embolism and excluded those diagnoses with appropriate tests. When the combination of chest pain symptoms, serum troponin elevation and T-wave changes in the ECG was appreciated the patient was monitored and treated according to appropriate CCU standards. With settling of chest pain symptoms and evidence of improved mobility [Mrs A] gained confidence to consider returning home to nurse her new baby. During this phase of settled symptoms, stable physical findings, good mobility about the ward and improved appearances in her resting ECG [Mrs A] did not require ECG rhythm monitoring. It was appropriate that in-hospital exercise testing was done and following the positive changes in that test it was appropriate that she should be referred for in-hospital coronary angiography.

Although, with hindsight, we could say that it might have been an advantage to have done coronary angiography for [Mrs A] at an early stage in her illness I do not consider that it was a fault in clinical management to fail to transfer her to [the second public hospital] on the 18th of July.

Staff at the [the first public hospital] explained their understanding of [Mrs A's] condition to her on several occasions and also explained why they wished to undertake the investigations that they recommended. They did not trivialise the importance of possible underlying coronary heart disease. It is likely that in their descriptions they were using a standard, or usual, model of coronary disease – that which is related to the patchy degenerative condition called atheroma. What was not appreciated by either the medical staff or the […] family was that [Mrs A] did not have 'usual' coronary artery disease. If her doctors had known that she had dissection of the coronary vessels they would have explained the undue seriousness and rarity of that disorder and the greater urgency than usual that would be attached to considering angiography.

…

I have had the opportunity to review the case notes and I have been sent supplementary reports about the exercise ECGs and the post mortem details.

Notes: Brief chronology of [Mrs A's] illness and death

<u>Background illnesses</u>
An uncle had had myocardial infarction at age 38yr

Smoking, stopped 2 years before
Recently completed first pregnancy, IVF, delivery by Caesarean 10th July 2000, [Mrs A] had stayed a week in hospital prior to surgery with mild ankle swelling and some elevation of BP
No previous bouts of chest pain

Admission for Chest pain

14 07 2000 Admitted around 5am after waking in early hours with squeezing chest pain, accompanied by shortness of breath, nausea/vomiting. Pain felt to be nitrate responsive. Elevated BP noted on admission, no other definite physical findings. Normal ECG and chest Xray. From the outset the principal clinical diagnosis was of an unstable coronary syndrome ?unstable angina. ?myocardial infarction (MI). Early blood tests indicated troponin release and she was then admitted to CCU. By evening feeling better and forecasting that she would be keen to be discharged so that she could be at home looking after her baby.

15 07 2000 On the second hospital day the ECG had changed, showing T wave inversion in leads III and AVF. This supported the diagnosis of MI. [Dr E] was not convinced that this was the only condition to be considered and suggested more wide-ranging tests including CT pulmonary angiography to evaluate the possibility of pulmonary embolism. Treatment during this period was with the long-acting blood thinning drug clexane. This therapy meant that it was not advisable to feed her baby breast milk and so she expressed. Her abdominal wound was not comfortable at this stage but did not show specific evidence of surgical complications.

16 07 2000 Reported to be making good progress. BP 120/80. Very keen to be able to go home. Mobilising around ward.

17 07 2000 CT pulmonary angiogram done – result negative. Exercise test planned. and again looking forward to early discharge home after test.

18 07 2000 Exercise test. No pain during exercise but ST segment changes consistent with readily induced myocardial ischaemia. Plans made for angiography on 20th July. Procedure explained.

19 07 2000 Changed from long-acting blood thinner to short acting agent. Remained well and stable during daytime.

20 07 2000 Nurse visited in the early hours of the morning to check a blood test result used to monitor drugs. She discovered [Mrs A] pulseless and with dilated pupils. There was no response to full resuscitation.

ECG reports: Some of the tracings in the case-notes are undated and others are affected by artefact that makes them difficult to read. (This is a factor which should be raised with the [the first public hospital] authorities because there are many instances, and this is one of them, where accurate ECG reading is critical in making the timely diagnosis of an unstable coronary syndrome.)

[Mrs A's] tracings from approx 5am and 6am on the morning of admission do not indicate any abnormality. There is an ECG, labelled for [Mrs A] and timed at 0815, that

has a pattern that is so unlike that of the remainder of the graphs that I have to assume that it is a tracing taken from another patient and incorrectly labelled. At 1814 on the night of the 14th of July there is a technically unsatisfactory tracing that is probably from [Mrs A] but which does not give diagnostic information about any possible inferior wall changes.

On the 15th of July, at a time when nursing staff had noted some pulse irregularity, there is an ECG that shows new T wave inversion in leads III and AVF and some reduction in the T voltage in lead II. This appears to me to be the first EGG evidence that there is an evolving inferior wall abnormality.

Exercise Test
The exercise test ECG was done to an excellent standard of technical proficiency, giving clear recordings and B steady baseline throughout. This shows significant ST segment depression during exercise, typical of induced myocardial ischaemia and quite appropriately points to the likely need for angiography. At the same time it does not show electrical or hemodynamic instability such as low blood pressure with exercise or the creation of disordered rhythm (which might have formed a rationale for re-instituting further monitoring or expediting the planned angiogram test).

Postmortem Examination:
This showed the striking appearance of a tear within the wall and lining of the right coronary artery. The lesion was presumed to have commenced in a way that a) first, created a self-contained bruise within the wall of the artery, so obstructing the flow of blood to the posterior part of the heart and then b) later, to have ruptured so that the wall of the artery had a tear in it. There were also two areas of scarring in the muscle of the heart. One of these was felt to have occurred about a week before [Mrs A] died (probably around 14 07 2000) and the other probably happened on the night of her death.

There was also a healing wound together with some infection of doubtful significance in the wall of the uterus.

Specific answers to your Questions
1. *To advise the Commissioner whether services were provided with reasonable* care *and skill*. Yes, they were.
2. *Did the care provided to [Mrs A] meet the standard?* Yes, it did.
3. *Did [Mrs A's] blood test results (troponins plus enzymes) recorded on 14 07 2000 indicate that she had suffered a heart attack?* Taken on its own a single result would not necessarily be conclusive but a series of blood tests when taken in conjunction with symptoms and ECG changes did, in [Mrs A's] case, give strong support to the diagnosis of myocardial infarction.
4. *Was it possible to predict the serious nature of [Mrs A's] cardiac condition on 14 07 2000?* Yes, if an angiogram had been done on that day and if it had demonstrated coronary dissection it would have been possible to indicate to [Mr and Mrs A] that a rare and very serious condition was present. This is, however an argument made with hindsight and denies the fact that all clinicians who work in this field would

regard any heart attack, even those caused by coronary thrombosis, as serious (ie a life-threatening condition with considerable risk of sudden death).

5. *Did [Mrs A's] exercise test on 18 07 2000 indicate the seriousness of her condition?* Yes, to a partial extent. While any test that showed marked ST segment depression at low levels of work (for example during the first 5–6 minutes of testing) would give cause for considering that there was a major impairment of blood supply to at least one area of the heart muscle the test of 18/7 did not provide specific information about the rare underlying cause of [Mrs A's] coronary disease – ie the dissection or her right coronary artery.
6. *Should [Mrs A] have been transferred to [the second public hospital] immediately?* In the light of what happened it is inevitable that we would all prefer that [Mrs A] had been transferred to an angiographic laboratory at the earliest possible time but when considering the evidence that her clinicians had while they were looking 'forward' at events I do not see any fault in continuing to follow the timetable that had been made.
7. *Was [Mrs A's] cardiac condition appropriately monitored while she was at [the first public hospital]?* Yes, it was."

Code of Health and Disability Services Consumers' Rights

The following Rights in the Code of Health and Disability Services Consumers' Rights are applicable to this complaint:

RIGHT 4
Right to Services of an Appropriate Standard

1) Every consumer has the right to have services provided with reasonable care and skill.

RIGHT 6
Right to be Fully Informed

1) Every consumer has the right to the information that a reasonable consumer, in that consumer's circumstances, would expect to receive, including –
   a) An explanation of his or her condition; and
   b) An explanation of the options available, including an assessment of the expected risks, side effects, benefits, and costs of each option; …

Opinion: No breach – Dr B

Caesarean section
Dr B's decision to induce Mrs A on 7 July was made on clinical grounds. Mrs A was having her first baby, relatively late in her life. It was a fertility assisted pregnancy following two failed attempts. When Dr B saw her on 7 July the baby's head remained high and had not entered the pelvis. Believing her to be overdue and not wanting to take any chances with what he considered to be "an extremely precious pregnancy", he recommended induction. Mrs A responded well and her labour processed satisfactorily throughout the night but, by the following day, when the baby's head remained high, he recommended LSCS.

My obstetric advisor informed me that Dr B's decision to induce Mrs A at 39 weeks (rather than 41 weeks, which he erroneously thought to be the length of the gestation) would have prejudiced the obstetric outcome by increasing the risk that the induction would fail and a Caesarean section would be necessary. However, whether Mrs A would have spontaneously delivered vaginally remained in doubt given that the baby's head had not entered the pelvis at 39 weeks and failed to descend during the second stage of labour.

It is unrealistic to speculate whether Mrs A would have been able to have a normal vaginal delivery or to avoid a Caesarean section if Dr B had allowed her to go to term. In my opinion, when Dr B recommended that Mrs A be induced on 7 July, he responded reasonably to the circumstances at the time and did not breach Right 4(1) of the Code.

Opinion: No breach – The First Public Hospital

Cardiac care
Mrs A was admitted to the first public hospital following a bout of chest pain. Dr C examined her. Mrs A's cardiac enzymes, an indication of heart muscle damage, were abnormal and Dr C admitted her to CCU for continuous monitoring. Blood enzyme levels recorded the following day were even more suggestive of cardiac damage. However, despite these indicators, her EGCs were normal, her condition was stable, and she had no further chest pain. Her provisional diagnosis of unstable angina was treated with antiplatelet and anticoagulant medication. My cardiology advisor stated that this treatment was appropriate.

Dr E could not explain the reasons for Mrs A's abnormal enzyme results. Because of Mrs A's normal ECG, and in the absence of chest pain, she was transferred to the ward the following day. There was no strong evidence of heart attack or coronary artery disease. Once in the ward Mrs A was walking about the ward, she felt well, and it was no longer necessary to monitor her continuously.

Mrs A was scheduled for two cardiac investigations: pulmonary artery scan and ETT. A pulmonary artery scan on 17 July excluded pulmonary emboli. An ETT was performed on

18 July. The cardiologist stopped the test after five minutes because of Mrs A's abnormal ECG. This result and the elevated cardiac enzymes raised Dr E's suspicions that Mrs A had a serious diagnosis but the investigations at that point were not specific enough to make a definitive diagnosis. Dr D took immediate steps to arrange Mrs A's transfer to the second public hospital.

A complicating factor in Mrs A's care was that she was breastfeeding but could not do so while she was taking Clexane. To maintain lactation she expressed milk every four hours and this made her breasts sore. When she experienced chest pain it was necessary to differentiate between heart pain and breast pain. On the evening of 18 July Mrs A complained of chest pain, which she described as different from the pain that woke her on 14 July. This pain did not respond to two doses of nitrolingual spray but responded to the application of cabbage leaf. Cardiac pain usually responds rapidly to nitrolingual spray. Therefore, Ms G concluded that Mrs A's pain was more likely to be associated with lactation.

Mr A believes that Ms G should have taken an ECG. However, Mrs A was able to describe to Ms G the differences in the type of pain she was experiencing. Ms G was reassured by the good results achieved with a cabbage leaf, and the failure of the nitrolingual spray to provide relief, and was confident in her diagnosis. Dr E doubted that an ECG recorded at that time would have shown any abnormality.

My cardiac advisor assured me that he is confident that staff made reasonable diagnostic and management decisions about Mrs A's symptoms. They considered important chest pathology and excluded various diagnoses with appropriate tests and investigations. In light of Mrs A's rapid improvement, settled chest pain, stable physical signs, good mobility and wish to return home, my advisor did not consider it necessary for her to be monitored continuously. Such monitoring would not have been normal practice in any other hospital in New Zealand.

Mrs A's cardiac enzymes were abnormal. However, my cardiac advisor said that a single test might not indicate a heart attack, and that other symptomatology, such as a series of abnormal enzyme results, ongoing chest pain, and changes in ECG recordings, are more likely indicators of heart attack.

I have also considered the reports from Dr I and Dr J. Their review of the first public hospital's services is consistent with the advice from my independent cardiologist. All the expert evidence supports the conclusion that the staff at the first public hospital treated Mrs A's symptoms appropriately. Accordingly, I am satisfied that Mrs A was treated with reasonable care and skill at the first public hospital and that it therefore did not breach Right 4(1) of the Code.

Transfer to the second public hospital

The second public hospital accepted Mrs A for cardiac angiography and provided her with an appointment in two days. Dr L, Dr D and Dr E agreed that Mrs A should remain in hospital until the result of the angiogram was known. Mr A believes that his wife's placement on the waiting list was based on Dr E's assessment of her cardiac risk and that if

Dr E was unable to explain the cause of his wife's test results, his risk assessment would not have been accurate. Mr A considers that his wife should have been transferred to the second public hospital as soon as the ETT was stopped prematurely.

Dr E said that it was possible to have an immediate angiogram at the second public hospital if there were clinical indications that the patient was likely to have a heart attack within hours. Mrs A's test results did not indicate that degree of urgency. My cardiology advisor noted that the ETT did not induce haemodynamic changes, such as a low blood pressure, or a disorder in heart rhythm, which would have been a rationale for continuous monitoring or immediate angiography. However, cardiac angiogram investigation was needed to form a definitive diagnosis and this could only be performed at the second public hospital. The decision about when Mrs A should have her angiogram was based, in part, on Dr E's assessment of her cardiac risk.

Dr D said he pressed the second public hospital for an early angiography appointment because Mrs A had a new baby, was attempting to establish breast-feeding, and wanted to go home. It was these factors, rather than her cardiac status, that motivated him to seek an early appointment.

Dr J assessed the cardiac risk to Mrs A as initially low, but said that the abnormal ETT result placed her in the "higher risk group". My cardiology advisor indicated that Mrs A's ETT results suggested that she had a major impairment to at least one part of the heart muscle, but that the test was not specific enough to identify the "rare underlying cause" that was discovered later. My advisor and Dr I agreed that if it was not for Mrs A's ETT it would have been standard practice to discharge her and readmit her for angiogram at a later time.

Dr L explained that decisions regarding placement of patients on cardiac catheter waiting lists are the result of discussions between the second public hospital's cardiologists and the referring specialist. The second public hospital's cardiologist weighs the clinical details of the patient under discussion with other patients awaiting appointments. I accept that Mrs A's cardiac angiography appointment was made at the second public hospital's earliest convenience and was not delayed because Dr E underestimated the risk.

Accordingly, in my opinion the first public hospital's medical staff provided Mrs A with services with reasonable care and skill and it therefore did not breach Right 4(1) of the Code.

Cardiac monitoring

Mr A believes that his wife's condition was inadequately monitored because she was not placed on continuous cardiac monitoring. Mrs A was admitted to CCU where she was continuously monitored from the time of her admission until the evening of 15 July. When she was transferred to another ward, continuous monitoring ceased.

Mrs A was considered well enough to be transferred to the ward because her ECG was normal, her observations were stable, and she reported no further chest pain. My cardiology advisor noted that it is not standard practice to continuously monitor a patient

with unstable angina and no other cardiac symptoms. Dr J and Dr I agreed. Dr I suggested that Mrs A's cardiac arrest would have been detected earlier and perhaps successfully treated if she had been monitored continuously, but in his view she was not at sufficient cardiac risk to warrant such measures.

I accept that it is not standard practice in New Zealand hospitals to continuously monitor patients once their condition is assessed as stable. I am satisfied that Mrs A was adequately monitored at the first public hospital and that it therefore did not breach Right 4(1) of the Code.

Advice about seriousness of condition
Mr A reported that neither he nor his wife was aware of the seriousness of her illness. If they had been fully informed of the risks to her he could have stayed with her.

Mrs A had unstable angina but no other specific symptoms. Her cardiac enzymes suggested that she had cardiac muscle damage but no other symptoms of a heart attack. Her ETT was grossly abnormal, suggesting significant coronary artery disease, but no significant disease was detected at post-mortem. My cardiology advisor noted that the ETT did not induce haemodynamic changes, such as low blood pressure or a disorder in heart rhythm, which would be a rationale for continuous monitoring or immediate angiography. However, cardiac angiography was needed to form a definitive diagnosis and, until she had a diagnosis, it was advisable for her to remain in the first public hospital. Mrs A's records indicate that as the results of each investigation became available, they were explained to her.

There is substantial evidence that no one involved in Mrs A's care was fully aware of the risks. My independent cardiologist, Dr E, Professor K, and the two cardiologists who reviewed the care provided by the first public hospital commented on the rarity of coronary artery dissection. I am satisfied that staff attempted to inform Mrs A (and Mr A) of the results and implications of her tests and investigations. Accordingly, the first public hospital did not breach Right 6(1) of the Code.

Opinion: No breach – Ms G

Cardiac monitoring
The complaint against Ms G is that she did not adequately monitor Mrs A after she was admitted to the ward. Ms G was the nurse on duty when Mrs A complained of chest pain at 2.00am on 19 July. Mrs A was able to clearly differentiate between the pain that woke her in the early hours of 14 July and the pain she was experiencing on 19 July. Ms G first used nitrolingual spray to treat the pain, which was unsuccessful. She then used cabbage leaf successfully. This indicated to her that Mrs A's pain was not cardiac in nature. According to Ms G she excluded cardiac pain and was confident Mrs A's pain was the result of expressing breast milk.

Ms G did not take an ECG recording. Dr D expressed some doubt about whether an ECG recorded at that time would have shown any changes.

I am satisfied that Ms G took reasonable steps to locate the origins of Mrs A's pain and to monitor her condition, and did not breach Right 4(1) of the Code.

Opinion: No breach – Ms F

Cardiac monitoring
The complaint against Ms F is that she did not adequately monitor Mrs A after she was admitted to the ward. Ms F was the nurse responsible for Mrs A's care on the evening of 19 July 2000. The records indicate that Mrs A had last experienced chest pain the evening before and had had no chest pain during Ms F's duty. Mrs A continued to express breast milk every two to three hours during the evening. She had general aches and pains, which were relieved by Panadol. She was not on a cardiac monitor.

My cardiology advisor noted that as Mrs A had had a period of settled symptoms, was physically stable, and was moving about the ward independently, she did not require continuous monitoring. I accept this advice.

In my opinion Ms F took reasonable steps to monitor Mrs A's condition and did not breach Right 4(1) of the Code.

Opinion: No breach – Dr C

Cardiac care
Dr C was the medical registrar on duty when Mrs A came to the first public hospital at 5.00am on 14 July 2000. Dr C examined Mrs A and considered that a clot could be the cause of her pain, but that it could also be related to cardiac ischaemia. Dr C ordered cardiac enzyme investigations because, in her view, Mrs A's chest pain should be treated as heart pain until proven otherwise. Dr C arranged Mrs A's admission to the AAW on the understanding that if her cardiac enzymes were elevated she should be admitted to CCU. When Mrs A's enzymes were shown to be elevated she was transferred to CCU for closer monitoring and investigation. This was the appropriate treatment for a heart attack or unstable angina.

My cardiology advisor noted that a single elevated cardiac enzyme result, taken on its own, would not indicate a heart attack. This result needed to be interpreted together with a series of blood tests, the recurrence of cardiac symptoms and ECG changes. In his opinion Mrs A's cardiac care was reasonable and met appropriate standards. I am satisfied that Dr C cared for Mrs A appropriately and did not breach Right 4(1) of the Code.

Follow-up of treadmill test and advice about seriousness of condition
Dr C had no further contact with Mrs A after her initial examination and treatment on the morning of 14 July 2000. She was therefore not responsible for following up the abnormal ETT results or advising Mr and Mrs A about the seriousness of Mrs A's illness.

Opinion: No breach – Dr D

Follow-up of treadmill test
Dr D was the cardiac registrar at the first public hospital when Mrs A was transferred to CCU on 14 July. Dr D's first contact with Mrs A was in responding to an enquiry from the ward pharmacists about whether Mrs A should have Clexane while she was breast-feeding. After Mrs A's transfer to the ward, Dr D had no further contact with her until the results of her ETT were known on 18 July.

Dr E asked Dr D to arrange for Mrs A to have an angiogram at the second public hospital as soon as possible. Dr D reviewed the test result and immediately discussed Mrs A's symptoms with the second public hospital's cardiologist, Dr L, who agreed that Mrs A should remain in hospital until the angiogram was completed. Dr D then spoke to the booking clerk at the second public hospital to ensure that they had all the information needed and there would be no delay in the booking. The angiogram appointment was made for 20 July.

Dr D explained the significance of the treadmill test result to Mr and Mrs A. The test revealed significant coronary disease and Dr D told them it was important for Mrs A to remain in hospital until the results of her angiogram were known. Dr D was aware that Mrs A had a new baby and wanted to go home but he advised against this because the treadmill test results suggested that Mrs A might have "high-risk coronary disease". It was Mrs A's personal circumstances that prompted Dr D to try to obtain an early appointment, rather than fear that she would suffer a cardiac catastrophe.

My cardiology advisor informed me that, with the benefit of hindsight, it would have been advisable for Mrs A to have had angiography earlier in her illness, but he did not consider it a fault in her clinical management that she was not transferred to the second public hospital earlier. I accept this advice. In my opinion Dr D cared for Mrs A appropriately and did not breach Right 4(1) of the Code.

Advice about seriousness of condition
Mr A believes that he and his wife were not fully informed about the seriousness of her illness. Dr D assured me that he spent a considerable period of time with Mr and Mrs A informing them of the reasons she should remain in hospital until the angiogram provided a diagnosis. He also explained the angiography procedure itself, including the possible complications.

I have reviewed the various reports from Professor K, Dr I, Dr J, and Dr M, and from my independent advisor, Dr McHaffie. Spontaneous dissection of the coronary arteries is described in the literature as a rare event. The evidence suggests that Mrs A's death was totally unexpected by all those who cared for her. Nevertheless, I accept that Dr D and medical staff at the first public hospital knew that Mrs A's symptoms were serious and that there was a real possibility that she had significant cardiac problems, even though a definitive diagnosis had not been made at the time of her death.

I am faced with a conflict between Mr A's perception of the information provided to them, and Dr D's account of the information he provided. I have no reason to believe that medical staff, including Dr D, did not make every effort to keep Mr and Mrs A properly informed. My advisor suggested that what was not appreciated by the medical staff or the family was that Mrs A did not have "usual" coronary artery disease. If they had been aware of her rare condition, medical staff would have explained the "undue seriousness and rarity" of the disorder and the "greater urgency than usual" attached to this rare event. I accept this advice.

I am satisfied that Dr D attempted to keep Mrs A (and Mr A) properly informed about her illness and did not breach Right 6(1) of the Code.

Opinion: No breach – Dr E

Cardiac care
Dr E was the Clinical Director of Medical Services at the first public hospital during Mrs A's admission. Dr E's first contact with her was during his ward round in CCU at 10.30am on 14 July. Dr E admitted that he did not explain the reasons for Mrs A's elevated cardiac enzyme levels, but noted that elevated enzymes alone did not indicate she had suffered a heart attack. Her elevated Troponin 1 indicated an injury to heart muscle, which could have a number of causes. Nevertheless he commenced anticoagulant therapy, and continued cardiac monitoring, anti-platelet therapy and serial enzymes prescribed by Dr C that morning. This was appropriate treatment for pulmonary embolism or heart attack. The following day Mrs A was symptom free and Dr E arranged her transfer to another ward under the care of the medical team.

Dr E did not believe that Mrs A had suffered a pulmonary embolism, and this was confirmed by pulmonary artery scan on 17 July. Under normal circumstances Mrs A would have been discharged with an appointment to return for the ETT in five or six weeks. However, even though Mrs A had no significant chest pain, Dr E ordered the ETT the following day before she went home.

Follow-up of ETT
Dr E reviewed the results of Mrs A's ETT and asked Dr D to arrange for Mrs A to have an angiogram at the second public hospital as soon as possible. The ETT revealed that Mrs A had significant coronary disease and Dr E considered that it was important for her to remain

in hospital until the results of her angiogram were known. Dr D arranged the angiogram for 20 July. As the clinician in charge of Mrs A's care, Dr E considered this prioritisation appropriate.

Mr A believes that Dr E did not fully appreciate the seriousness of his wife's condition, made an inaccurate assessment of cardiac risk, and incorrectly influenced her ability to have an angiogram urgently. Mr A believes the angiogram should have been performed as soon as the result of the ETT was known.

The urgency with which patients are placed on the cardiac catheter theatre waiting list is determined by their perceived instability. In Mrs A's case the ETT result and elevated cardiac enzymes suggested significant coronary disease but her condition was thought to be stable. She had spontaneously recovered from the initial symptoms, was moving freely about the ward, and had no significant new ECG changes and no ongoing chest pain. Although Dr E recognised that Mrs A's condition was serious, he did not consider her sudden death likely.

My cardiology advisor informed me that, with the benefit of hindsight, it would have been advisable for Mrs A to have had angiography earlier in her illness, but he did not consider it a fault in her clinical management that she was not immediately transferred to second public hospital. I accept this conclusion. In my opinion Dr E cared for Mrs A appropriately and did not breach Right 4(1) of the Code.

Advice about seriousness of condition

Mr A believes that he and his wife were not fully informed about the seriousness of her illness. Dr D assured me that he spent a considerable period of time with Mr and Mrs A informing them of the reasons she should remain in hospital until the angiogram provided a diagnosis. He also explained the angiography procedure itself, including the possible complications.

Dr E knew that Mrs A's symptoms were serious and that there was a real possibility that she had significant cardiac problems, even though a definitive diagnosis had not been made. The evidence suggests that no one involved in Mrs A's cardiac care believed her death would be so sudden.

As each investigation result became available either Dr D or Dr E explained the significance to Mrs and Mr A. I have no reason to believe that Dr E, either directly or via Dr D, did not make every effort to keep Mr and Mrs A properly informed. My cardiology advisor suggested that what was not appreciated by medical staff or the family was that Mrs A did not have the "usual" coronary artery disease. If they had been aware of the rare condition, medical staff would have explained the "undue seriousness and rarity" of the disorder and the "greater urgency than usual" attached to this rare event. I accept this advice.

I am satisfied that Dr E attempted to keep Mrs A (and Mr A) properly informed about her illness and did not breach Right 6(1) of the Code.

Other comment

Estimated delivery date
Dr H's notes clearly state that Mrs A's LMP was 8 October 1999, the insemination 18 October, and the EDD 15 July 2000 (although it could be 10 July if calculated from the insemination date). Dr H confirmed her pregnancy on 23 November. According to Dr B, Mrs A told him at his first consultation with her on 6 December that her LMP was 24 September 1999, and he recorded this date in her notes. He did not have a written referral from Dr H and relied on Mrs A's statement of a 24 September LMP, and his erroneous record of the date of insemination as 8 October, to estimate Mrs A's EDD as 11 July.

The first two scans in December noted the EDD as 10 and 11 July; the latter is recorded in Mrs A's notes. However, the February scan at 20 weeks changed the EDD to 1 July. Mrs A's notes were changed and Dr B advised Mr and Mrs A of the date change during his consultation with them on 23 February. The 1 July EDD was confirmed by two subsequent scans.

My obstetric advisor noted that it is important, at the first consultation, to establish the expected delivery date. Dr B recorded an incorrect LMP date (on the basis, he says, of incorrect information given to him by Mrs A), and erroneously noted the date of insemination as 8 October (he admits this was a mistake). My obstetric advisor noted that Dr B made an additional error when he calculated the EDD as 11 July: "If one uses an obstetric calendar to calculate out the EDD from 24 September 1999 it worked out to be 1 July 2000. There is clearly a discrepancy here and it should have been noted at the time that either the LMP or the EDD was incorrect as they do not match."

I note my advisor's further comment that he is "at a loss to explain how [Dr B] felt that the LMP given by [Mrs A] was 24 September as information available to him from [Dr H] clearly stated that the LMP was 8 October with insemination of sperm performed on 18 October". Although Dr B did not have Dr H's records when he saw Mrs A on 6 December, there is no evidence that he took steps to obtain her records from Dr H subsequently and check the information relevant to the pregnancy.

Dr B also failed to check with the radiologist why the EDD reported by the 23 February ultrasound scan had been revised from 10-11 July to 1 July; had he done so he may have discovered that there was a misprint and it should have read 15 July.

Mr A believes that Dr B induced his wife to "fit in" with his holiday plans, but I can find no evidence of this. Dr B incorrectly recorded Mrs A's LMP and EDD on 6 December. A sonographer and radiologist confirmed the 1 July date. Furthermore, there were other obstetricians available to cover Dr B when he went on holiday on 16 July. I have no reason to believe that Dr B's mistake, first recorded on 6 December, was designed to fit in with his holiday plans or that the radiologist and sonographer, in confirming the wrong date, conspired to mislead Mr and Mrs A.

The EDD, first calculated by Dr H in November 1999, was 15 July – therefore an EDD of 1 July at 20 weeks would be within the normal range. My advisor indicated that Dr B's

decision to induce Mrs A at what he thought was 41 weeks would be within international guidelines and could not be criticised.

Nevertheless, in my opinion a prudent obstetrician would not have made the recording and calculation errors made by Dr B at the initial 6 December consultation, would have obtained and checked the gynaecologist's records, and would have queried the revised EDD calculated by the radiologist.

Error in documentation – cardiac services
My independent cardiologist commented that Mrs A's medical records contained ECG tracings that were not identified, tracings that were of poor technical quality, and tracings that showed cardiac activity that he would not attribute to Mrs A. Therefore he concluded that not all the ECG tracings in Mrs A's medical records belonged to her.

Accurate ECG readings are critical in diagnosing unstable coronary syndrome. I will draw this issue to the attention of the first public hospital.

Action

- A copy of this opinion, with all identifying features removed, will be sent to the Royal Australian and New Zealand College of Obstetricians and Gynaecologists and the Royal Australasian College of Physicians, and placed on the Health and Disability Commissioner website, www.hdc.org.nz, for educational purposes.