Registrar, Dr B

A Report by the

Health and Disability Commissioner

(Case 03HDC13310)

Health and Disability Commissioner
Te Toihau Hauora, Hauātanga

Parties involved

Ms A	Consumer (dec)
Mr A	Ms A's father, complainant
Mrs A	Ms A's mother, complaint
Dr B	Provider, pathology registrar
Mr C	Mr & Mrs A's solicitor
Dr D	Consultant Haematologist
Dr E	Paediatric Haematologist/ Clinical Director
Dr F	On-call consultant surgeon
Dr G	Surgical registrar
Dr H	Anaesthetic registrar
Dr I	After-hours general practitioner
Dr J	ED consultant
Dr K	Anaesthetic consultant
Dr L	Surgical registrar
Ms M	Haematology technician
Dr N	Haematology consultant
Mr O	PACU nurse
Mr P	Registered nurse
Ms Q	Registered nurse
Ms R	Registered nurse
Dr S	Director Anatomical Pathology

Complaint

The Commissioner received a complaint from Mr C, Mr and Mrs A's lawyer, about the events leading to the death of their daughter, Ms A (age 12), in a public hospital. The issues investigated in relation to the complaint were:

- *Whether Dr B provided Miss A with services of an appropriate standard after he was informed about Miss A's abnormal blood results. In particular Dr B's clinical decisions in relation to:*

  - *whether to personally review and check Miss A's blood film results*
  - *whether to order a repeat platelet count, order coagulation status blood testing, and give a platelet transfusion*
  - *whether to discuss the blood film results with the consultant haematologist*
  - *the information provided to the surgical team about the blood film results and the need for platelet transfusion.*

I have now completed my investigation into the complaint and, in my opinion, Dr B did not breach the Code of Health and Disability Services Consumers' Rights. The reasons for my opinion are set out below.

Investigation
As a Coroner's Inquest was pending, I delayed deciding what action to take on Mr and Mrs A's complaint until after the Coroner's hearing.

Following the Coroner's decision, Mr C advised me that Mr and Mrs A had a number of unresolved issues. Consequently, Mr C sought further comments on the Coroner's decision from haematologist Dr D. Dr D explained in an emailed report:

> "[T]he fact that the haemorrhagic diathesis [diathesis is any abnormality that makes the patient more prone to disease – haemorrhagic diathesis is a blood disorder that made Miss A more prone to infection] was neither investigated, quantified by standard laboratory practice nor treated, despite the child having a high risk of this complaint, indicates that [the DHB] has failed to deliver its duty of care to the child …"

Subsequent to this, I commenced an investigation.

Information reviewed
Mr C sent me a copy of the Coroner's decision and the notes of evidence given during the Coroner's hearing. These notes included the transcripts and briefs of evidence from the hearing and contained expert reports from Dr D, a Consultant Haematologist, and Dr E, a Paediatric Haematologist and Clinical Director.

I also received information from Dr B and Dr B's lawyers, further reports (including one prepared for the ACC investigation into Miss A's death) from Dr E, additional information from Mr C and Dr D, and information from Drs F, G, and H, and from the first public hospital.

I reviewed Miss A's medical records from the first public hospital.

Subsequently I sought independent expert advice from Dr Bartrum Baker, Specialist Haematologist at Palmerston North Hospital with responsibilities for clinical and laboratory haematology (including transfusion medicine). By way of background, Dr Baker was nominated by the Haematology Society of Australia and New Zealand (NZ Branch) as an expert advisor to assist me with investigations of complaints in the area of his expertise. Dr Baker's expert advice is **attached.**

Information gathered during investigation

At about 10pm an after-hours GP service doctor, Dr I, contacted surgical registrar Dr G to arrange Miss A's admission to the first public hospital, as she had a two-day history of feeling unwell with abdominal pain and vomiting.

Miss A arrived by ambulance at the Emergency Department ("ED") at 10.04pm. She was promptly examined by the ED Consultant, Dr J, at 10.09pm. Dr G was notified of Miss A's arrival and he proceeded to ED, arriving at approximately 10.20pm.

Miss A was ill (triage category 2, requiring treatment in 10 minutes). Although alert and orientated, she was extremely distressed with pain. She exhibited signs of sepsis and shock, with cold, mottled extremities, a sign of "peripheral shutdown". Dr J diagnosed septicaemia, complicating her primary illness. He commenced resuscitation with intravenous infusions, inserting one in each arm, intravenous antibiotics for the infection, and morphine to control her pain. He took blood for culture, full blood count, urea and electrolyte analysis. Miss A received two litres of fluid intravenously while she was in ED. Her condition improved with a rise in blood pressure, decrease in heart rate (from 140 to 120) and reduction in pain. The preliminary blood test results reported to ED at 10.51pm noted neutrophils of 5.53 (normal range 2.00-7.50). No platelet count was provided as the technician was checking the results.

Once Miss A's condition was stable, Drs J and G turned their attention to finding the cause of her illness. An abdominal ultrasound revealed free fluid in the abdomen and a complex mass in the right groin area. Dr G made a preliminary diagnosis of appendicitis (with possibly a ruptured appendix) and peritonitis. Dr G discussed Miss A with the consultant surgeon on call, Dr F, shortly before 11pm, and the senior house officer in anaesthetics, Dr H. Dr H consulted the anaesthetic consultant, Dr K, to tell him of three surgical cases pending, one of whom was Miss A. All agreed that Miss A should proceed to theatre for an urgent appendectomy under general anaesthetic.

Theatre

Dr H commenced Miss A's anaesthetic at 11.35pm and the operation began shortly before midnight. The theatre team consisted of Drs G and L, surgical registrars, and Dr H, the senior house officer in anaesthetics. Dr G performed the operation assisted by Dr L.

Blood analysis

Ms M was the technician working in the haematology department that night. She received Miss A's blood sample for full blood count from ED. She put the blood specimen through the analyser. She noted that the platelet count was low at 49 (a normal count is 150-400). She checked the specimen for clotting or "clumping" which can account for false low platelet results, and sent the results through to ED. The platelet count was not included with the other results. Because the count was low she made a blood film which, when stained, revealed blast cells.

Phone conversation with Ms M
Ms M paged Dr B to discuss the results. Although a pathology registrar, Dr B was on call for the haematology and the blood transfusion service. Dr B had only just arrived home after finishing duty at the hospital and was watching the news when Ms M paged him, just before midnight. Dr B phoned Ms M back. She told Dr B the blood test results and that she thought the results indicated that Miss A had leukaemia. Dr B gave evidence before the Coroner that he respected Ms M as a very experienced technologist and had known and worked with her for many years.

As a pathology registrar, Dr B was able to cover haematology on call because he had worked in haematology for one to two years and had satisfied the consultant haematologist that he was competent to interpret changes in blood films, bone marrow and coagulation abnormalities, and appropriately prescribe blood products. Dr B advised that, at the time, he was in his fifth year as a registrar in anatomical pathology.

Neither Dr B nor Ms M was aware when they spoke that Miss A had been taken to theatre for surgery. Dr B asked Ms M to perform a corrected neutrophil count and then to phone ED and report that Miss A had "a population of primitive cells" and that further tests would be conducted in the morning. Dr B gave evidence to the Coroner that he wanted the ED doctors to get this information quickly because there was a risk that Miss A might be discharged from ED before the abnormal tests were fully investigated and Dr B considered it was essential that she be admitted to hospital.

Dr B also gave evidence at the Coroner's hearing that the presence of blast cells in a peripheral blood sample is diagnostic of leukaemia and that blast cells should only be found in bone marrow. Confirmatory tests would require bone marrow samples. Dr B stated that he would previously have gone to the hospital and taken a bone marrow sample (Dr B did not know Miss A was in theatre at the time) but that these specialist tests were now only done at a second public hospital. Dr B anticipated that Miss A would be transferred to the second public hospital in the morning.

Dr B did not discuss the results with Dr N, the haematology consultant on call at the first public hospital, or the registrar at the cancer centre at the second public hospital. Dr B advised me that Dr N was new to the service and that Dr B "did not appreciate the extent to which Dr N preferred to be kept informed. It was not something which had been communicated to [Dr B] by Dr N."

Ms M phoned ED and spoke to Dr J, informing him that Miss A had a population of primitive cells in the blood, and of her corrected neutrophil and validated platelet counts. Dr J later recalled that she referred to "leukaemia" but wondered whether infection could be the cause of the abnormal results. He informed Ms M that Miss A was in theatre and asked her to contact the theatre team directly.

Ms M telephoned the theatre and spoke to Dr H about the results and he advised the surgical registrars, Drs G and L, that the blood tests revealed a low platelet count and the presence of blast cells. Dr G interrupted surgery to discuss the results with Dr F.

Discussion between Drs B and H
Dr H telephoned Dr B about the significance of Miss A's blood results. Dr B was surprised by Dr H's call because he did not know Miss A was in theatre. Dr B told Dr H that the blood results were consistent with acute leukaemia and explained that a platelet count of 49 was low and that for *elective* surgery it was preferable that a patient have a platelet count above 100. Dr B asked about Miss A's coagulation status. Dr H replied that Miss A had not bled excessively during surgery, experienced no complications and was haemodynamically stable at the time.

Dr B advised Dr H that Miss A should be closely monitored for bleeding and, depending on her clinical situation, platelets were available if required. Dr B informed Dr H that the blood film would be reviewed first thing in the morning. Dr B did not discuss where Miss A should be monitored postoperatively.

Dr H recorded the following in Miss A's records:

> "Contacted by haematology tech + Plt (platelets) = 49"
> …
>
> "? underlying haematological disorder – will review tomorrow am. If requires plts, can be provided. DO NOT DISCHARGE BEFORE HAEMOTOLOGY HAVE BEEN CONTACTED AGAIN RE BLOOD FILM'."

Following Dr B's conversation with Dr H, he did not contact either Dr N, the on-call haematology consultant, or the registrar at the cancer centre at the second public hospital.

Discussion between Drs G and F
Dr G phoned Dr F to discuss the blood findings. They discussed Miss A's low platelet count, haemostasis, and the unexpected inflammatory changes Dr G had found during surgery. On completing his call to Dr F, Dr G asked Dr H to give the additional antibiotic, gentamycin (Miss A had been given antibiotics in ED). Dr F did not advise Dr G to give Miss A a blood or platelet transfusion because there was no clinical evidence of bleeding or clotting problems; Dr B had not recommended a platelet transfusion, and Dr F did not consider a transfusion necessary at that point. Dr F was not aware that Dr B had not discussed the results with the haematology consultant on call, Dr N.

Dr G performed a routine appendectomy, assisted by Dr L. Dr G found that Miss A had a moderately inflamed appendix and widespread inflammatory changes within the abdomen. Dr G was not convinced that the severity of Miss A's condition in ED was explained by the surgical findings. When Dr H gave him the haematology report, he again thoroughly explored the surgical area but could find no other abnormality.

Dr G knew the blood findings could suggest an underlying haematological malignancy which should be investigated postoperatively. There was no excessive bleeding during surgery or from the wound, and Dr H found no evidence of bleeding when he removed the

endotracheal tube at the completion of the operation. Before Miss A left theatre, a urinary catheter was inserted to monitor her urinary output.

Postoperative care
Dr G and Dr H discussed where Miss A should be monitored. The High Dependency Unit had no spare beds and, as Miss A had had no complications during surgery and showed no evidence of bleeding, they considered that she could be nursed in the paediatric ward.

Miss A was transferred to the Post Anaesthetic Care Unit (PACU) where she remained for a very short time (approximately 30 minutes). Dr H reviewed Miss A twice in that time. The nurse on duty was Mr O. Miss A's heart rate and temperature remained elevated and she was dehydrated, as evidenced by her low urinary output, but otherwise she remained stable. Dr H was happy with her progress, and advised Mr O that she could be transferred to the paediatric ward. Mr O rang the ward at 1.40am. Miss A, accompanied by Mrs A, arrived in the paediatric ward at about 2.00am.

Three nurses were on duty in the paediatric ward that night: registered nurses Mr P and Ms Q, and enrolled nurse Ms R. Ms R went to PACU to receive the handover report and transfer Miss A to the ward.

Dr L reviewed Miss A in the paediatric ward at 2.10am. He noted that she was alert and feeling better, with a soft abdomen, stable observations and no sign of excessive bleeding. Mr P took Miss A's observations at 2.30am and secured a splint to her arm to help the intravenous flow. Her temperature remained elevated (38°C) and pulse fast (140bpm), and her urinary output was good (35ml that hour). Miss A's limbs remained slightly mottled in appearance but her "capillary return was good and hands warm". Mr P prepared a stretcher for Mrs A, who intended to stay with Miss A overnight.

At about 2.30am Mrs A heard Miss A making heavy breathing, sighing noises and asked Mr P about it. He recalled hearing what he described as normal post-anaesthetic breathing. Mrs A went to sleep at about 3am.

At 3am Mr P checked Miss A again and reported her unchanged. He took her observations: blood pressure 112/62, pulse 132, respiration 22 and oxygen saturation 97%. There was no further ooze from her wound and her abdomen had the same appearance and feel as before. At 3.30am Mr P checked Miss A again. She remained unchanged. Dr L phoned the ward soon after 3.30am, and was told that Miss A appeared satisfactory. Mr P also assured Mrs A that Miss A's observations were stable and he would check her again shortly.

Soon afterwards, Miss A's IV alarm sounded and Ms R went into Miss A's room. Ms R found the IV fluid bag empty, but was more concerned about Miss A's appearance and immediately reported to Mr P. Miss A had suffered a cardiac and respiratory arrest at about 3.55am. Attempts at resuscitation were unsuccessful.

Follow-up
Dr B did not contact either the haematology registrar or the on-call haematology consultant about Miss A's case before departing the following morning for a professional meeting in

Sydney. Dr B gave evidence before the Coroner that he twice attempted to contact the on-call haematology consultant that morning (mistakenly believing him to be a doctor other than Dr N) but was unsuccessful. Dr B also advised me that he endeavoured unsuccessfully to contact the haematology registrar to discuss Miss A's case and provide contact numbers but received no reply. Dr B explained that he was running to catch a plane and knew that the round to discuss all the cases admitted overnight was held every morning at 8.30am. Dr N, the on-call haematology consultant, learned of the case at the pathology management meeting that morning.

Post-mortem results
A post-mortem examination was carried out by the Clinical Director of Anatomical Pathology, Dr S, who reported: "The deceased Miss A died at the first public hospital on …, death being due to clostridium septicum septic shock complicating necrotising neutropenic typhlitis and oesophagitis in association with acute leukaemia and haemorrhagic diathese."

Evidence before the Coroner indicates that it was only once the post-mortem results were known that it became evident that the organism underlying Miss A's infection was the extremely serious *Clostridium septicum*.

Literature search conducted by Dr D
During my investigation Dr D provided me with a series of research abstracts and concluded: "A literature search provides published evidence in support of the contention that Miss A's death was potentially avoidable." Dr D advised me:

> "One can conclude from these abstracts that survival with [Miss A's] condition is possible: overall survival 35%, 79% mortality in the particularly lethal form of C. septicum … 20% survival with malignant disease, 33% mortality in review of all cancer patients found to have C. septicum in two teaching hospitals in Texas over a 6 year period."

In conclusion, Dr D advised that the research suggested that Miss A's chances of survival depended on "fully interventional intensive care support" because, when a septic patient presents and is found to have cancer, *C. septicum* should be suspected as the offending organism. Dr D considered that this grave risk would have been evident to Dr N and the intensivists in the DHB, but they were never contacted by Dr B. Dr D considered that as a consequence of Dr N not being consulted, Miss A was placed in a paediatric ward rather then ICU, which "effectively sealed her fate in that death was inevitable". He stated that as Miss A was stable early in the postoperative phase it "can only support the contention that her life may have been salvageable at that point".

Dr D also expressed the view that the fact that the haemorrhagic diathesis was not investigated, qualified by statutory standard laboratory practice, or treated, despite the child having a high risk of this complaint, indicates that the DHB failed to deliver its duty of care to the child.

Dr B's response to Dr D's literature search and conclusions
Dr B provided me with a response to Dr D's literature search and the conclusions that he reached.

After reviewing the articles and abstracts that Dr D relied on, Dr B concluded that they do not support his proposition that "[Miss A's] chances of survival depended on 'fully interventional intensive care support' ". Dr B submitted that the statistical survival figures that Dr D quoted were misleading and stated that he viewed as more accurate the statistic from Cancer 1986; 57: 2045-2048, which showed a 100% mortality rate in the study of 11 children with leukaemia and *Clostridium septicum* infection.

Independent advice to Commissioner

The following expert advice was obtained from Dr Batrum Baker, Specialist Haematologist:

> "My name is Bartrum William Baker and I have been asked to provide an opinion to the Health and Disability Commissioner on case number 03/13310, [Miss A], who died in [a public hospital] on …. I have read and agree to follow the Commissioner's Guidelines for Independent Advisors in compiling this report.
>
> **Qualifications, Training and Experience**
>
> I obtained my primary medical degree (MBChB) from Otago University, graduating in 1983. I subsequently underwent postgraduate training at Christchurch Hospital (1983-90) where, after working as a House Officer and Medical Registrar, I commenced specialist training in Haematology in 1987. I completed my training with a two-year Research Fellowship at the Patterson Institute for Cancer Research at the Christie Hospital in Manchester. I hold joint Fellowships with the Royal Australasian College of Physicians (1992) and the Royal College of Pathologists of Australasia (1991).
>
> Since 1992, I have held my current post as a Specialist Haematologist at Palmerston North Hospital, with responsibilities for clinical and laboratory haematology (including transfusion medicine) in this area, as well as providing a regional haematology service to the lower central North Island. In this role, I have had extensive experience in managing adults with acute leukaemia and in the day-to-day management of patients with bleeding disorders.
>
> I do not have any particular experience or expertise in paediatric oncology … [h]owever, the events prompting this report relate to the *initial* diagnosis and management of a child with acute leukaemia in a setting very similar to my hospital rather than to the subsequent specialised management of childhood leukaemia in a tertiary paediatric oncology centre. Therefore, I believe that my training and experience are relevant to the questions that have been posed about this case.

Acquaintance with Parties Involved

I am obliged to document any connections that I may have to any of the parties involved in this case. To my knowledge, I have never met or worked with [Dr B] or any of the other doctors directly involved in this case, apart from [Dr N], who, as a colleague in the relatively small haematology community in New Zealand, is well known to me.

This case has already been the subject of reports to the inquest and subsequent comments by two other expert witnesses, [Dr E] and [Dr D]. Both of these doctors are very well known to me and, as a general haematologist, I occasionally seek the specialist advice of [Dr E] on matters relating to childhood haematology and of [Dr D] on clotting or bleeding issues, particularly relating to specialised tests performed by [a] laboratory on patients in our region.

I have had no discussion or communication about this particular case with [Dr N], [Dr E], [Dr D] or any of the other parties involved.

Instructions from the Commissioner

My specific instructions are to advise whether, in my opinion, in his role as a haematology registrar of one to two years' experience, [Dr B's] clinical decisions about the following matters were appropriate for a registrar of that experience:

1. *whether to personally review and check [Miss A's] blood film results*
2. *whether to order a repeat platelet count, order coagulation status blood testing, and give a platelet transfusion*
3. *whether to discuss the blood film results with the consultant haematologist*
4. *the information provided to the surgical team about the blood film results and the need for platelet transfusion*

In regard to matter number 3 above (i.e. whether to discuss [Miss A's] abnormal blood film results with the consultant haematologist) I have been asked to advise in particular whether [Dr B's] clinical decisions were appropriate:

- on the first occasion when he was called by the laboratory technician, [Ms M], regarding the abnormal blood results;

- on the second occasion when he was consulted about the abnormal blood results by the anaesthetic registrar, [Dr H], for advice during [Miss A's] emergency surgical procedure.

Also, in regard to matter number 3 above, I have been asked to provide my comments on the points raised by [Dr B's lawyer], in his letter to the Commissioner dated 14 October 2004, and the points raised by [Dr E] in the attachment to that letter dated 12 October 2004. In regard to the points raised by [Dr E], I have been particularly asked to comment on the explanation he gives for his previous statement (contained in his

report to the inquest) that *"for the future"* consultation would *"not only be wise but recommended"*.

Material Studied

In preparing this report I have studied all of the documents couriered to me on 2 November 2004 by the Office of the Commissioner. These are summarised in Appendix 2, and I have referred to these documents in my report by page number, as provided to me. I understand that the Commissioner made a provisional decision on 3 June 2004, which I have not viewed, but the Commissioner's subsequent provisional decision dated 23 September 2004 was sent to me as part of the briefing material.

After receiving this material, I was also forwarded two letters (both dated 9 November 2004) sent to the Office of the Commissioner from [Dr B's lawyer] and from [Dr B]. These related specifically to the literature search and abstracts on *Clostridium septicum* infection cited by [Dr D], as outlined in [Mr C's] letter to the Commissioner dated 24 June 2004.

Where any of this material is referred to in my report I have used the page numbers provided. I have also reviewed relevant medical literature, and this is referenced, where appropriate, in my report, with a list of references in Appendix 1.

Finally, I have briefly discussed the expected appearances at post mortem of someone who has undergone extensive cardiopulmonary resuscitation with one of my colleagues, an experienced anatomical pathologist.

Summary of Events

The events leading to [Miss A's] admission and subsequent death have been well described in the various reports provided for the coroner and I include the summary provided to me by the Office of the Commissioner in Appendix 3, since the facts of this case are essentially not in dispute. I have also added a summary of the HDC investigation to date, including the various letters and opinions that have been generated subsequent to the coroner's inquest being completed, since these are pertinent to my report.

Specific Questions

Before responding to the four specific questions that have been asked, I feel that I must briefly comment on one aspect of this case that dominated the inquest and that has been the subject of considerable debate since. This is the question as to whether [Miss A's] death was inevitable or whether some of the different interventions that have been suggested in hindsight may have saved her life. I have read the abstracts submitted by [Dr D] in conjunction with the letter from [Mr C] dated 24 June 2004, which suggest that, in some circumstances, a significant proportion of patients with *Clostridium septicum* infection can survive (pp 41-57). I have also read [Dr B's] detailed review of the papers cited by [Dr D] (pp20C-20J) submitted with [Dr B's lawyer's] letter to the Commissioner on 9 November 2004 (pp20A-20B), suggesting that quoting survival

figures from many of these studies is misleading and that his interpretation of these studies is that infection caused by this organism in a child with untreated acute myeloid leukaemia is almost invariably fatal, consistent with the opinion expressed repeatedly by [Dr E].

Although this question may be of fundamental importance to [Miss A's] family and to those involved in her care, my role in this report is to provide an opinion about whether [Dr B's] actions constituted an acceptable standard of care at that time, *irrespective of the outcome*. Therefore, while accepting that [Miss A] was suffering from a rare and usually lethal infection, this information was not available to any of those involved in her care until after her death and is essentially irrelevant to this discussion.

However, by way of background information, it should be noted that neutropenic sepsis (infection in the presence of a low white blood cell count) is very common in patients with acute leukaemia both at the time of diagnosis and as a result of chemotherapy. Although these infections can be fatal, young patients generally cope with these infections reasonably well, provided that appropriate antibiotics and supportive care such as intravenous fluids are administered promptly. Clostridium septicum is a very rare and unusually severe form of infection in this setting and her unexpected, rapid deterioration after being apparently quite stable is, in my (fairly extensive) experience of managing neutropenic sepsis, unusual.

1. Dr B's decision not to personally review and check Ms A's blood film and blood count results.

In my opinion, Dr B's decision to rely on the experience of the senior technologist in the Haematology Laboratory (Ms Ms) and not to review the film personally that night was appropriate.

- The presence of primitive bone marrow cells (blasts) in the peripheral blood, together with low levels of the normal blood cells is virtually diagnostic of acute leukaemia.
- An experienced technologist should be capable of making this provisional diagnosis and I do not believe that review by a Registrar or Haematologist before the following morning is necessary in a case such as this, unless the technologist has significant doubts about the blood film appearances. I cannot find anything in the statement by [Ms M] (pages 158-9) or in the transcript of her evidence from the coroner's court (pages 153-157) to suggest that she had significant doubts about this diagnosis, although she 'didn't feel comfortable' about the fact that [Dr B] had not come to review the film (p 159).
- The precise diagnosis and classification of the leukaemia would normally occur on the basis of a bone marrow examination and specialised tests, which were (appropriately) deferred until the likely transfer of [Miss A] to [the second public hospital] the following day.
- I note the statements at the Inquest of [Dr E], which is consistent with my opinion, and those of [Dr D], [Dr N] and [Dr S], which express a contrary

opinion about this matter. Therefore, there is considerable variation amongst specialists about what constitutes acceptable practice in this regard.

I would like to comment specifically on [Dr S's] comments in the Coroner's court (p149). I note that he describes his own practice in what I assume to be Anatomical Pathology (although the transcript appears to have been inaudible at this point). I believe that it may be appropriate practice for an anatomical or histopathologist such as [Dr S] to review abnormal slides personally. However, histopathology differs from haematology in that technologists in histopathology do not generally report or interpret pathology slides in the same way that haematology technologists do for blood films, such as the one in question. Therefore, while it may be necessary for an anatomical pathologist such as [Dr S] to personally review abnormal material in his own practice, in my opinion, this should not necessarily apply to the Haematology laboratory, where technologists routinely review slides and become experienced in recognising diseases such as acute leukaemia.

- The practice of experienced technologists reviewing abnormal blood films, without the immediate back-up of a haematology registrar or consultant is widespread and is standard practice in our region. In large regional hospitals such as […], there is no capacity for review of an abnormal film such as this one in the middle of the night by a haematologist and the usual practice is for the technologist to discuss the results with a haematologist by telephone and to courier such films for urgent review the following day. [Dr E] considers that 'it would not be standard practice, nor common, for an on-call registrar to attend at the hospital to confirm an experienced technician's diagnosis in such a case' (p 36).

Therefore I believe that it is difficult to argue that what is considered acceptable practice by at least some experienced haematologists (including [Dr E] and myself) and is, of necessity, standard practice in large hospitals in many parts of this country can be considered a failure to meet the standard of care reasonably expected in these circumstances.

2. [Dr B's] decision not to order a repeat platelet count, order coagulation status blood testing, and give a platelet transfusion.

In my opinion, [Dr B's] advice to the clinical team and decisions about these tests and the transfusion did not constitute a failure to meet the standard of care and skill reasonably expected of him in these circumstances.

- There was no reason to suspect that the original platelet count was erroneous. [Ms M] appropriately checked for clots in the specimen and made a blood film to check for platelet clumps. Both of these can lead to falsely low platelet counts. I note that in [Dr B's] statement to the Commissioner he states that he had been told that there were platelet clumps present by [Ms M], which can lead to a falsely low platelet count (p 26). However, [Ms M] makes no reference to this in her statements and the final blood count report (p273) included a validated platelet count, with no reference to platelet clumps. Additionally,

although the blood count analyser printout (p 274) suggested the presence of red blood cell fragments (which can cause a falsely elevated platelet count) there is no suggestion that this phenomenon was seen on the blood film as evidenced by the final report (p 273) and by the comments of [Ms M] (p 153-9) and [Dr N] (p 136) on their examination of the blood film. It could reasonably be assumed by [Dr B] that further testing, including a repeat blood count would be ordered a few hours later when [Ms A's] management would have been taken over by the (day time) paediatric and haematology teams.

- Whether a repeat blood count and coagulation testing, including a screen for disseminated intravascular coagulation (DIC), should have been ordered postoperatively is, I believe, more contentious. [Dr B] stated that he advised 'monitoring of haemostasis' and that [Miss A] should be 'monitored closely after surgery as her platelet count was known to be 49 x 10^9/L' (p 132). While there is no evidence that he specifically advised that this monitoring should include further blood tests post-operatively, the decision to do this or not rested at least partly with the clinical team looking after her. Despite frequent, careful postoperative reviews by [Drs H, and L], there was no clinical evidence of abnormal or excessive bleeding until the time of her cardiac arrest at approximately 0345. The absence of bleeding as late as 0330 is clearly documented in her medical records by the registered nurse [Mr P] (p 240), although I note that this entry appears to have been made after [Ms A's] death and that there was some discussion about the adequacy of documentation of the nursing observations during the coroner's hearing ([Dr D's] initial report, p 88).
- There is disagreement between the other haematologists who have commented on this case about the need for coagulation testing that night. [Miss A] was certainly at risk for DIC, with her severe sepsis, but the diagnosis of DIC and the need to treat it with platelet transfusion or other blood products is heavily dependent on the clinical picture, with widespread bruising, bleeding from venepuncture sites, mucosal membranes and surgical wounds typical of severe DIC. There was no evidence of any of these phenomena in [Miss A] until her arrest, as outlined above, despite careful observations by Dr H in the post anaesthetic recovery unit (p 162) and [Dr L] in the paediatric ward at 0210 hrs (p237).

  The clinical context is fundamentally important in the ordering and interpreting of all laboratory tests, including those used to diagnose DIC, as stressed in a recent standard haematology text: 'The diagnosis of DIC is, indeed, a clinical diagnosis', with laboratory tests needed to 'confirm the diagnosis' (Kitchens 2002). Although a low platelet count is one of the laboratory features of DIC, the likely diagnosis of an acute leukaemia was sufficient to explain her moderately low platelet count that evening and the absence of any clinical evidence of DIC, despite careful examination for such evidence, was reasonable grounds for deferring such tests, in my opinion.
- Although there was some evidence of abnormal bleeding at the time of her cardiac arrest, the assumption made by several members of the arrest team that she had bled significantly into her abdomen does not seem to have been supported by the post mortem examination, at which only 400 mL of

'moderately blood-stained fluid' was found in the abdominal cavity, probably consistent with her typhlitis and recent surgery. The major sites of haemorrhage (as opposed to 'blood-stained *fluid*') at post mortem were the lungs (predominantly the lower lobes); the trachea and major bronchi; and the lower two thirds of the oesophagus (which also showed evidence of 'neutropenic oesophagitis' on microscopic examination). Of note, these sites are all likely to have been subject to fairly extensive trauma during the approximately 50 minutes of cardiopulmonary resuscitation (CPR), including external cardiac compression, to which [Miss A] was subjected. My colleague has confirmed for me that such appearances can be seen in patients who are subjected to prolonged efforts at CPR prior to death. Therefore, although [Miss A] did have a haemorrhagic diathesis (a tendency to bleed abnormally), I believe that there must be some doubt as to how much this contributed to her death and I tend to agree with [Dr E's] assertion that 'it was the Septic Shock and not the DIC, which was the cause of her death' (p 61).

Therefore, although coagulation testing and a repeat blood count were not specifically advised by [Dr B], his decisions in this regard were made in the knowledge that [Miss A] had undergone a major surgical procedure without any evidence of the abnormal bleeding that is required to diagnose significant DIC. Moreover, he could reasonably assume that these tests would be done routinely within a few hours and that he would be contacted again if she were to exhibit any of the symptoms typical of DIC. Again, although many other doctors in his position may have acted differently, I consider his actions in these matters to have been acceptable practice in the circumstances.

3. [Dr B's] decision not to discuss the blood film results with the Consultant Haematologist

In my opinion, [Dr B's] decision to not call the Consultant Haematologist was consistent with an acceptable standard of care at that time, although I note that, following review of this case, [the diagnostic laboratory is] drafting a set of guidelines concerning the circumstances that should require notification by the on-call pathology registrar to the relevant senior medical officer (p 224).

- This aspect of [Dr B's] management is the most difficult to comment on, since it is very difficult to define the circumstances in which acceptable practice would mandate that a registrar contact his or her consultant. Furthermore, consultants vary in their preferences as to how closely they wish to be involved in the decisions taken by more junior staff after hours. [Dr N] has clearly stated that, as the consultant on-call that night, he would have expected [Dr B] to call him. In addition, he is clearly of the opinion that, had he been involved, his recommendations would have differed significantly from [Dr B's] (pp 136-142). However, as outlined by [Dr B's lawyer] in his letter to the Commissioner dated 14 October 2004 (p 16), [Dr N] was new to the service and [Dr B] had not been informed of his preferences as to the degree of his involvement after hours. Moreover, to my knowledge, there were no formal guidelines in place at that time (p 224).

- It has been suggested that at the time of this incident [Dr B] was in his fifth year as an anatomical pathology registrar and [Dr B's lawyer] implies rightly that this indicates a degree of significant seniority (p 17). However, it is difficult to comment on seniority in this context, given that it was in his role covering haematology services rather than anatomical pathology that [Dr B] was acting in regard to this case. Anatomical pathology is a quite separate discipline and experience in this area would not necessarily make [Dr B] competent to make complex decisions on matters relating to haematology. It seems from his curriculum vitae that [Dr B] was a trained laboratory technologist, working in Transfusion Medicine before entering medical training in 1989. He spent a full year as a haematology registrar in 1997 and had been employed as an anatomical pathology registrar in […] ever since. I assume that he had been involved in the haematology on-call roster for some years at the time of this incident and would have reasonably extensive experience in providing this service, as well as his previous experience as a full-time haematology registrar for one year. On this assumption, I believe that he was justified in making significant decisions about a patient such as [Miss A] without involving the consultant haematologist on-call.
- [Miss A] became critically ill and died before a senior haematologist had any input into her case and, *in retrospect*, I have no doubt that even the most senior and competent registrar would want to involve their consultant in the care of such a patient as soon as possible. However, in my opinion, on the information available to [Dr B] at the time, there was little to suggest that [Miss A] was in danger of dying so soon after admission, before specialist input could occur the following morning.
- I have been specifically asked to comment on whether [Dr B] should have contacted his consultant at the time that he was called by [Ms M]. In my opinion, the fact that a blood count has suggested a likely diagnosis of acute leukaemia would not have been sufficient to mandate involving a consultant in the middle of the night. Although acute leukaemia is a serious illness which leads to serious problems and (eventually) to the death of a significant proportion of those diagnosed with this condition, the median survival even of 'untreated' acute myeloid leukaemia is measured in months. Therefore, until further information about the clinical status of the patient became available, I believe it was quite reasonable for [Dr B] not to involve the consultant on-call immediately.
- I have also been asked to comment specifically on whether [Dr B] should have contacted his consultant later that night after he had been telephoned by [Dr H] during [Ms A's] appendicectomy. I believe that there is a more compelling case for suggesting that [Dr N] should have been involved at this time, since it had become clear by this time that [Miss A] not only had acute leukaemia but she had evidence of infection and was in the middle of surgery for a presumed appendicitis. However, [Dr B] appropriately had a 'quite detailed' discussion about [Ms A's] condition with the clinicians directly responsible for her care at that time and careful consideration was given to whether her haemostasis was clinically adequate (p27). He quite correctly recommended close monitoring of

her haemostasis and advised that platelets were available if the clinical situation warranted. Moreover, although he made it clear that he was available for further advice if the situation were to change, he was not contacted again because of the sudden nature of [Ms A's] deterioration.

- Finally, I have been specifically asked to comment on [Dr E's] comments in a letter to [Dr B's lawyer] dated 12 October 2004 (p19) explaining his previous statement to the inquest in which he suggests that 'for the future', appropriate consultation by the registrar in similar cases would 'not only be wise but recommended' (p62).

  [Dr E] makes it very clear in his statement to the inquest and in the more recent letter that, in his opinion, [Dr B] did not err significantly in failing to consult with senior colleagues at the time. In fact, his 12 October letter (p 19) was written as a direct response to the provisional opinion of the Commissioner and expresses his concern that his earlier comments may have been relied on by the Commissioner in making his provisional finding that Dr B breached the code in this regard (p 13).

  I believe that [Dr E's] comments in his statement to the inquest about *future* recommendations are a reflection of the fact that, if any good can come from a tragedy such as this, it is that all those involved can reflect on their practice and consider making any desirable changes. [Dr B] has made it clear that, 'in hindsight' he regrets not contacting his consultant and has lowered his threshold for involving senior staff (p28). [Dr E's] suggestion that, in future, all new cases of childhood malignancy be discussed with senior colleagues (p62) appears to stem from retrospective analysis of the issues raised by this case. Indeed such a recommendation is likely to be considered as part of the guidelines being drafted by [the diagnostic laboratory], as outlined above. However, no such guidelines or recommendations were available to Dr B on the night in question.

  [Dr E] comments in his letter to [Dr B's lawyer] that such consultation 'shares the burden of care' and provides 'professional support and development' to junior medical staff. While acknowledging the terrible suffering of the family of a patient who dies unexpectedly, all those staff members involved in such cases are also likely to be deeply affected. Those who have made important decisions in these circumstances are burdened with the knowledge that their decisions failed to avoid such an outcome – even if the decisions were appropriate at the time. Although [Dr E] believes that it would not have made any difference to the outcome of this case, discussion with the consultant haematologist [at the first public hospital] and with the paediatric oncologist [at the second public hospital] at the time [Miss A] presented could have reassured her family and the staff involved that all possible avenues of advice had been explored, and would not have left an individual junior doctor [Dr B] bearing all of the 'burden' for the haematological decisions that were made.

Had it been known that [Miss A] had an infection (Clostridium septicum) that is lethal in the vast majority of cases, senior haematology and paediatric consultants should have been involved at an early stage in the hope of changing the outcome.

However, at the time of [Dr B's] involvement, there was no clear evidence that [Miss A] was suffering from such a serious infection and until a few minutes before she was found to have suffered a cardiac arrest, she appeared to be recovering well from surgery, with acceptable heart rate, blood pressure, urine output, oxygen saturation and physical appearance. Therefore, it is my opinion that his decision not to involve the consultant haematologist was a reasonable one, under the circumstances.

4. The information provided to the surgical team about the blood film results and the need for platelet transfusion

In my opinion, the information provided to the surgical team by [Dr B] and his involvement in the decision not to transfuse platelets was consistent with an acceptable standard of care.

- There has been considerable discussion about [Dr B's] decision to request that [Ms M] contact the Emergency Department with the results of the blood count rather than do this himself and I do not intend to re-visit this. The blood test results were communicated to the clinical team in a timely fashion and, predictably, communication did subsequently take place between [Dr B] and the team looking after [Miss A]. It is the adequacy of this communication and the decision not to transfuse platelets that I will consider.
- When [Dr B] was telephoned by [Dr H], the anaesthetics registrar, it seems clear that [Ms A's] clinical condition was discussed in detail. There is some debate as to whether [Dr H] was clearly informed that the blood picture was typical of acute leukaemia (p170), although [Dr G] seemed to believe that [Dr B] had communicated the likely diagnosis of a 'haematological malignancy' (p190). However, of more relevance, it is clear that [Dr B] asked specifically about haemostasis, as spelled out in [Dr H's] statement: 'We then discussed the results collectively. With direct questioning by [Dr B], it was clearly established from the surgical registrars that there was no unexpected bleeding and that haemostasis was adequate'. I am labouring this point, because I think that it is of crucial importance in determining whether [Dr B's] care was of an acceptable standard. The decision not to transfuse platelets was not a brief, arbitrary decision, made in ignorance of the clinical situation; it was a carefully considered decision based on the absence of any sign of abnormal bleeding, despite the fact that [Miss A] was undergoing a significant surgical procedure.
- Moreover, the decision not to transfuse platelets was not irrevocable. [Dr B] apparently made it clear that platelets would be available should they become necessary. His view was that, having ascertained that there was no abnormal bleeding at that time, 'the decision to use blood products was a clinical one, and that blood products were available'. I believe that this was an appropriate response and [Dr B] was not contacted again for further advice.
- The decision not to transfuse platelets has also been discussed extensively, given that [Ms A's] platelet count was 49 x 10^9/L. A number of guidelines and consensus

statements on this topic have been issued over recent years and several of those commenting on this case have discussed the threshold of 50 x 10^9/L (equivalent to 50,000/µL) being recommended before an elective (i.e. planned) operation. This is consistent with the British Committee for Standards in Haematology (BCSH)guidelines (BCSH, 2002), but other recent guidelines would accept a slightly lower threshold, as outlined in the clinical practice guidelines of the American Society of Clinical Oncology, in which: 'The Panel suggests on the basis of accumulated clinical experience, as attested to by a variety of consensus conference statements, that a platelet count of 40,000/µL to 50,000/µL [40-50 x 10^9/L] is sufficient to perform major invasive procedures with safety, in the absence of associated coagulation abnormalities' (Schiffer *et al*, 2001). Obviously, in this case, there was no laboratory testing of associated coagulation abnormalities as has been discussed above, but, as has also been repeatedly stated, there was no clinical evidence to suggest that there were such abnormalities.

It also must be borne in mind that the thresholds suggested in these guidelines are not based on good evidence from randomised controlled studies but are based on anecdote and expert opinion. A recent review on this subject eloquently highlights this: 'While there are abundant data on prophylactic transfusions in non-bleeding patients, there are fewer studies on the threshold that should be used to administer prophylactic platelet transfusions prior to surgery or invasive procedures. While the general recommendation has been that platelets should be given at counts < 50,000/µL for such hemostatic challenges, there is very little or no data to support this commonly used threshold. Every clinician can remember patients who bled extensively with platelet counts above this level. Every clinician can also remember many patients who had successful major surgery at counts well below this level, including liver transplantation, requiring neither platelet transfusions nor experiencing excessive bleeding' (Heal & Blumberg, 2004).

- Finally, it is worth emphasising that platelet transfusion is not entirely without risk. Serious reactions (including fatalities) have been well described following platelet transfusion (Heal & Blumberg, 2004). While the potential benefits of platelet transfusion outweigh these small risks in many circumstances, the clearly defined risks associated with the administration of blood components make it essential that these products are only administered when they are clearly indicated. Therefore it is not acceptable practice to simply recommend platelet transfusions to anyone who might possibly need them, without weighing up the individual risks and benefits in any given situation.

In summary, I believe that the advice given by [Dr B] to the surgical team and the decision not to transfuse platelets was reasonable under the circumstances known to him at that time. The decision was made after careful consideration and discussion of the clinical situation with those immediately responsible for her care; the offer was made for further advice to be given if the situation changed; and it was made clear that blood products were available if they were clinically indicated. Although her platelet count was marginally below the threshold deemed desirable for elective surgery in some (but not all) guidelines, in my opinion it was appropriate to rely more on careful and regular clinical assessment of her haemostasis than on the results of laboratory tests. Had abnormal bleeding developed as a result of her thrombocytopenia or any other

coagulation abnormalities, I believe that it was reasonable to have assumed that this would have developed gradually and been detected in time to provide appropriate blood product support. Furthermore, as discussed under question 2 above, on the information available to me, I believe it unlikely that Ms A's dramatic deterioration and death were primarily due to bleeding.

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.

Opinion: No breach – Dr B

Personally reviewing films

Background
When Dr B telephoned Ms M just before midnight, in response to being paged by her, she told Dr B about Miss A's low platelet count and the appearance of immature (blast) cells and that she thought this was a "new leukaemia".

Dr B asked Ms M to perform a corrected neutrophil count and then to telephone the Emergency Department and advise that Miss A had a population of primitive cells. At the Coroner's hearing Dr B gave evidence that he wanted the Emergency Department doctors to get this information quickly to prevent Miss A from being discharged before the abnormal tests were fully investigated.

Dr B did not go to the laboratory to review the blood film personally.

Evidence before Coroner
The specialists who gave evidence at the Coroner's hearing in respect of this issue disagreed about whether Dr B's decision not to review the blood film personally was appropriate.

Dr N gave evidence that he thought Dr B should have gone to the hospital to review the blood film personally:

> "because patients with a diagnosis with leukaemia sometimes can be confused with a number of disorders and it's therefore important that the diagnosis is confirmed by someone reasonably senior" (page 48 of the transcript).

Dr S agreed that Dr B should have gone to the laboratory to look at the blood film:

> "It is very dangerous to talk about patient or condition without looking at actual specimen through the microscope and it is my routine to come and have a look, even in the night, whatever the day is, it is my practice, I usually come and have a look at it ... I would say sensible doctor should come" (page 4 of the transcript).

In contrast, Dr E did not consider that Dr B should have gone to the laboratory to review the blood film personally. Dr E expressed the view that the decisions Dr B took in relation to his discussion with Ms M about the blood film results were "completely justifiable and appropriate" (page 3 of Report for Inquest).

Dr E emphasized that this was a *provisional* diagnosis only, which would be verified, as is customary, by a subsequent definitive diagnosis (involving additional tests) undertaken during routine hours. In light of this being a provisional diagnosis, he said:

> "…[W]e wouldn't expect a Registrar to confirm a technologist's interpretation of those things, to come in and look at that to say the same thing … I wouldn't expect that a Registrar would come in to confirm a technologist's interpretation of the presence of 'blasts' in the blood film …" (pages 25 & 26 transcript).

In the report Dr E prepared later for the ACC investigation, he also commented:

> "In my view, it would not be standard practice, nor common, for an on-call registrar to attend at the hospital to confirm an experienced technician's diagnosis in such a case."

Independent expert advice

My independent expert advisor, Dr Baker, considered that Dr B's decision not to review the blood film personally was "appropriate". He stated:

> "In my opinion, [Dr B's] decision to rely on the experience of the senior technologist in the Haemotology Laboratory and not to review the blood film personally that night was appropriate."

Dr Baker also stated:

> "I do not believe that review by a Registrar or Haematologist before the following morning is necessary in a case such as this, unless the technologist has significant doubts about the blood film appearances. I cannot find anything in the statement by [Ms M] (pages 158-9) or in the transcript of her evidence from the coroner's court (pages 153-157) to suggest that she had significant doubts about this diagnosis, although she didn't feel comfortable about the fact that [Dr B] had not come to review the film (page 159)."

In addition, Dr Baker noted:

> "The practice of experienced technologists reviewing abnormal blood films, without the immediate back-up of a haemotology registrar or consultant is wide-spread and is standard practice in our region. In large regional hospitals there is no capacity for review of an abnormal film such as this one in the middle of the night by a haematologist and the usual practice is for the technologist to discuss the results with a haematologist by telephone and to courier such films for urgent review the following day."

Dr Baker also made the point with regard to Dr S's evidence that Dr S's sphere of practice (which Dr Baker understands to be anatomical pathology) differs from haematology because:

> "technologists in histopathology do not generally report or interpret pathology slides in the same way that haematology technologists do for blood films, such as the one in question. Therefore, while it may be necessary for an anatomical pathologist such as [Dr S] to personally review abnormal material in his own practice, in my opinion, this should not necessarily apply to the Haematology laboratory, where technologists routinely review slides and become experienced in recognizing diseases such as acute leukaemia."

Conclusion

It is clear that there is a difference of opinion amongst the various specialists and expert advisors who have given evidence and advice on this issue about what constitutes an appropriate standard of care in this situation.

On the one hand, Drs N and S from the first public hospital believe that Dr B should have gone to the laboratory to review the blood film personally.

On the other hand, two independent advisors, Dr E and Dr Baker, believe that Dr B's decision was appropriate.

I am satisfied from the advice of these two experts that there is a responsible body of medical opinion that would regard Dr B's decision not to review the blood film personally as proper in the circumstances. Dr B's decision to rely on the experience of a senior technologist in the Haematology Laboratory, and not to review the blood film personally, reflects standard practice in many parts of the country.

Accordingly, I find that Dr B did not breach his duty of care under the Code by failing to personally review the blood films.

Ordering repeat platelet count and coagulation testing

Background
During Dr B's involvement with Miss A's care he did not order a repeat platelet count or coagulation status blood testing.

Evidence before the Coroner
The haematologists who appeared at the Coroner's hearing disagreed about whether Dr B's decisions not to order a repeat platelet count or coagulation testing were appropriate.

Dr N gave evidence that, in his opinion, Dr B should have ordered a repeat platelet test. He gave two reasons for this: first, he advised that a low platelet count can occur for a number of reasons including that the technique for blood collection could have been faulty; and secondly, he stated that because Miss A had a history of fever and peritonitis "disseminated intravascular coagulation should have come up, it resulting in a low platelet count and a clotting screen should have been done including a full DIC screen" (transcript p 49).

Dr D considered that Dr B should have ordered coagulation screening blood tests. In his opinion it was a "gross omission not to request that coagulation screening blood tests, including fibrinogen assay, be performed in light of the fact that a neutropenic, septic patient with acute leukaemia had just undergone surgery". Because of Miss A's severe sepsis, he considered that she was at risk of developing a coagulation disorder, DIC, and that she had an increased risk of bleeding because she did not have an adequate number of platelets for normal clotting (page 4 Report to Inquest).

Dr D stated that, in his opinion, neutropenic septic patients "must have coagulation testing … to fully assess the patho physiology of what's going on in order to implement intensive supportive management" (page 3 transcript).

Dr N agreed with Dr D that it was a "gross omission" for Dr B not to request that coagulation screening blood tests be performed.

In contrast, Dr E considered that coagulation tests were not clearly indicated based on the clinical information available at the time. He stated:

> "There was no indication to do additional … coagulation tests at the point in time when she had surgery" (page 21 transcript).

In the report he prepared for the ACC investigation, Dr E stated:

> "In my view coagulation tests were not clearly indicated for [Miss A] based on the clinical information that the clinical team, and [Dr B] had at the time of surgery. [Dr B] and the clinical team had an exceptionally good test of [Miss A's] haemostasis available to them, namely her bleeding response to the surgical wound. A coagulation test is an inferior measure of a patient's haemostasis to a surgical incision. We normally do a blood test because we do not have an incision by which to measure whether the

> patient has a bleeding problem. However [Miss A] did have a surgical incision, and had quite apparent very good haemostasis. Further at all reviews after surgery, there [were] no … clinical indications that [Miss A] had developed poor haemostasis" (page 6 Report for ACC Investigation).

Dr E concluded that all the decisions made by Dr B that night "were completely justifiable and appropriate" (Report to Inquest page 5).

Independent expert advice

My independent expert advisor, Dr Baker, advised that Dr B's decisions not to order repeat platelet count and coagulation testing represented "acceptable practice in the circumstances" and "did not constitute a failure to meet the standard of care and skill reasonably expected … in these circumstances".

Dr Baker stated that Dr B made these decisions in the knowledge that Miss A had undergone a major surgical procedure without any evidence of the abnormal bleeding that is required to diagnose significant disseminated intravascular coagulation ("DIC") and that he would be contacted again if she were to exhibit any of the symptoms typical of DIC.

With regard to Dr B's decision not to order repeat platelet count after receiving the blood film results, Dr Baker concluded that there was no reason to suspect that the original platelet count was erroneous and there was no suggestion of red blood cell fragments (which can cause a falsely elevated platelet count) on the blood film. Accordingly, Dr B could reasonably assume that further testing, including a repeat blood count, would be ordered a few hours later when Miss A's management would have been taken over by the day-time paediatric and haematology teams.

Dr Baker took the view that Dr B's decision not to order coagulation testing, including a screen for DIC, and a repeat blood count *post-operatively*, although "more contentious", nonetheless represented acceptable practice because of the "clinical context" which is "fundamentally important in the ordering and interpreting of all laboratory tests, including those used to diagnose DIC". He stated that "the diagnosis of DIC and the need to treat it with platelet transfusion or other blood products is heavily dependent on the clinical picture".

Dr Baker noted that whilst Miss A was certainly at risk for DIC, with her severe sepsis, there was an absence of clinical evidence of DIC until her arrest. He stated:

> "Although a low platelet count is one of the laboratory features of DIC, the likely diagnosis of an acute leukaemia was sufficient to explain her moderately low platelet count that evening and the absence of any clinical evidence of DIC, despite careful examination for such evidence, was reasonable grounds for deferring such tests, in my opinion."

Conclusion
There is a difference of opinion amongst the various specialists and expert advisors who have given evidence and advice about what constitutes an appropriate standard of care in this situation.

On the one hand, Drs D and N consider that it was a "gross omission" for Dr B not to request that coagulation screening blood tests be performed. Additionally, Dr N considers that Dr B should have ordered a repeat platelet test.

On the other hand, two expert advisors, Dr E and Dr Baker, believe that Dr B's decisions about these tests were appropriate and consistent with acceptable practice in the circumstances.

I am satisfied from the advice of these two experts that there is a responsible body of medical opinion that would regard Dr B's decisions not to order either a repeat platelet count or coagulation screening blood tests as proper in the circumstances.

In light of this, I have formed the view that Dr B's decisions not to order either of these tests were reasonable, and that Dr B d not breach his duty of care under the Code.

No discussion with consultant haematologist about blood film results

Background
Despite being contacted by Ms M advising Dr B of Miss A's blood film results, and later by Dr H seeking Dr B's advice from the theatre where Miss A was undergoing an emergency appendectomy, Dr B did not contact the on-call haematology consultant to discuss Miss A's blood film results.

Evidence before Coroner
The haematologists who appeared at the Coroner's hearing disagreed about whether Dr B's decision not to discuss Miss A's blood film results with the on-call haematologist was appropriate.

Evidence before the Coroner
Dr N, the on-call haematologist at the first public hospital that night, said that he would have expected Dr B to contact him. He gave the following reason:

> "This is because … decisions on management may need to be taken that evening so sometimes the patients with leukaemia present and are well and can wait until the next morning but those who are unwell, it is important that I am aware of what's happening so that we can manage them properly" (page 48 transcript).

He stated that Dr B's decision not to contact him was "regrettable" (page 51 transcript). Dr B pointed out that Dr N was new to the service and he had not communicated his expectations to Dr B.

Dr S also expressed the opinion that Dr B should have contacted the on-call haematologist (page 4 transcript).

Dr D agreed that Dr B should have contacted the on-call haematologist:

> "… in consideration of the facts that a neutropenic, septic patient with acute leukaemia had just undergone surgery, case discussion with the resident intensive care physician and consultant haematologist should have occurred" (page 6 of report to Coroner).

Dr D stated:

> "Not only did [Dr B] not refer to his consultant during the night, [Dr N's] statement indicated he did not communicate the problem to [Dr N] the next morning either, but seemingly went away 'on leave'. This absence of both acute and delayed communication with a line management senior colleague is remarkable."

In contrast, Dr E considered that all Dr B's decisions, including his decision not to discuss the blood film results with the on-call haematologist, were "completely justifiable and appropriate" (page 5 Report to Coroner).

However, *for the future*, Dr E stated:

> "It would not only be wise but recommended that the 'on call' registrar discuss newly diagnosed paediatric oncology patients with the "on call" senior Paediatrician and Haematologist (in case of leukaemia) and the regional Paediatric Haematologist/Oncologist, based at [the second public hospital], as all these senior consultants are only a phone call away. I stress this as appropriate process for the future as sharing the burden of responsibility for such rare, serious but devastating disorders is best done by involvement of senior colleagues so that the benefit of collective experience and specialist knowledge can be utilized" (page 5 Report to Coroner).

In a letter forwarded by Dr B's lawyer, Dr E clarified what he had meant when he made this recommendation:

> "This recommendation was directed at the professional support and development of junior medical staff. I certainly did not mean by that recommendation to suggest that in not consulting with senior staff, Dr B had in some way erred. In my opinion, he did not."

Independent expert advice

My independent expert advisor, Dr Baker, formed the view that, on the facts known to Dr B at the time, Dr B's decision not to contact the on-call haematology consultant to discuss Miss A's blood test film results was "reasonable" and "consistent with an acceptable standard of care at that time".

Dr Baker stated that, had it been known that Miss A had an infection (*Clostridium septicum*) that is lethal in the vast majority of cases, senior haematology and paediatric consultants should have been involved at an early stage in the hope of changing the outcome. However, at the time of Dr B's involvement:

> "there was no clear evidence that [Miss A] was suffering from such a serious infection and, until a few minutes before she was found to have suffered a cardiac arrest, she appeared to be recovering well from surgery, with acceptable heart rate, blood pressure, urine output, oxygen saturation and physical appearance".

In light of this, Dr Baker concluded:

> "Therefore, it is my opinion that his decision not to involve the consultant haematologist was a reasonable one, under the circumstances."

In forming his view Dr Baker also took into account the discussion Dr B had with the clinicians about Miss A's condition, Dr B's recommendation to them about monitoring of her haemostasis and advice that platelets were available if the clinical situation warranted their use.

Conclusion

There is a difference of opinion amongst the various specialists and expert advisors who have given evidence and advice about what constitutes an appropriate standard of care in this situation.

On the one hand, Drs D, N and S consider that Dr B should have contacted the on-call haematology consultant to discuss Miss A's blood film results.

On the other hand, two expert advisors, Dr E and Dr Baker, believe that Dr B's decision not to contact the on-call haematology consultant was appropriate and consistent with an acceptable standard of care in the circumstances.

I am satisfied from the advice of these two experts that there is a responsible body of medical opinion that would regard Dr B's decision not to contact the on-call haematologist as proper in the circumstances.

However, I am concerned by some aspects of the expert evidence which suggest that, even though Dr B's decision may be consistent with acceptable practice in the circumstances, it was not optimal.

In particular, I note Dr E's comments about the *future* importance for the on-call registrars "to discuss newly diagnosed paediatric oncology patients with the 'on call' senior Paediatrician and Haematologist (in case of leukaemia) and the regional Paediatric Haematologist/Oncologist, based [at the second public hospital]" and his statement that these discussions would "not only have been wise but recommended".

Dr E's subsequent advice to me was that this recommendation was directed at "the professional support and development of junior medical staff".

Similarly, Dr D gave evidence at the Coroner's hearing that there should be a guideline or recommendation that neutropenic, septic patients who are new to a service should be discussed at consultant level.

I note too that the Coroner in his decision made a recommendation to the District Health Board that practice guidelines be established dealing with the referral of cases by on-call registrars to the consultant. I address this matter in a recommendation letter in my report.

I acknowledge Dr B's own advice to the Coroner that, as a result of this case, Dr B has changed his practice and would now always contact his consultant in such a situation. Dr B has also advised me:

> "In hindsight I regret that I did not contact my consultant to discuss this case and as a consequence I now use a far lower threshold for involving the consultant in any case" (letter dated 5/02/04).

I note also that Dr B's new consultant appears not to have made clear his expectations to him. This case, like a number of cases investigated by the Commissioner, highlights the need for consultants to be clear and explicit in relation to their expectations about being contacted by registrars when on call (see my recommendation below).

In summary, despite the concerns outlined above, I have formed the view that Dr B's decision not to discuss Miss A's blood film results with the on-call haematology consultant was reasonable in the circumstances.

Accordingly, I find that Dr B did not breach his duty of reasonable care and skill under the Code.

Advice to surgical team regarding transfusion

Background
Although Dr B advised the surgical team that platelets were available if required, he did not recommend that a transfusion was immediately required.

Evidence before the Coroner
The haematologists who appeared at the Coroner's hearing disagreed about whether Dr B's decisions relating to platelet transfusion and advice to the surgical team were appropriate.

Dr N stated that advice to the surgical team to transfuse platelets should have been "forcefully put" by Dr B, because the patient had fever and was undergoing major surgery, and for that reason platelets were indicated (page 49 transcript).

Dr D considered that Dr B's advice to the clinical theatre team that platelets were not immediately required was "inappropriate". He stated that "platelet transfusion was

advisable" because the fact that surgery had been completed without report of abnormal bleeding did not lessen that risk, as bleeding can occur in the postoperative phase (page 6 of Dr D's Report to Inquest).

In contrast, Dr E expressed the view that the decision not to give platelet transfusion was "an entirely appropriate clinical decision at the time", and that Dr B's decision not to recommend platelets was also "appropriate", because there were no signs of any problems with bleeding. He stated:

> "The clinical findings did not suggest excessive bleeding. Whilst platelet transfusion therapy is generally recommended to *prevent* bleeding in someone with a platelet count of <50-100, once [Miss A] was actually being operated on and clinical bleeding problems were not obviously present (as they would be expected to be should haemostasis have been inadequate at that precise point in time) it was understandable that platelet transfusion was not given at that point, an entirely appropriate clinical decision at the time" (Report to Inquest and page 34 transcript).

Dr E emphasized that by the time Dr B was advising the clinical team about transfusion, Miss A had had "the most significant challenge possible to her haemostasis, in the form of surgical incision", and this was "the best test of whether she had a problem with bleeding. All of the signs were that she did not". He added:

> "As her platelet count was known to be 49 at that stage it was a clinically appropriate decision not to give platelets but to continue close observations for any signs that might indicate excessive bleeding" (Report for ACC Investigation).

Independent expert advice

My independent expert advisor, Dr Baker, advised that the information that Dr B provided to the surgical team and his involvement in the decision not to transfuse platelets "was consistent with an acceptable standard of care". He emphasized that Dr B had asked specifically about haemostasis when he spoke to Dr H in theatre and that:

> "[t]he decision not to transfuse platelets was not a brief, arbitrary decision, made in ignorance of the clinical situation; it was a carefully considered decision based on the absence of any sign of abnormal bleeding, despite the fact that [Miss A] was undergoing a significant surgical procedure".

Dr Baker concluded:

> "In summary, I believe that the advice given by [Dr B] to the surgical team and the decision not transfuse platelets was reasonable under the circumstances known to him at that time. The decision was made after careful consideration and discussion of the clinical situation with those immediately responsible for her care; the offer was made for further advice to be given if the situation changed; and it was made clear that blood products were available if they were clinically indicated. Although her platelet count was marginally below the threshold deemed desirable for elective surgery in some (but

not all) guidelines, in my opinion it was appropriate to rely more on careful and regular clinical assessment of her haemostasis than on the results of laboratory tests …"

Conclusion
There is a difference of opinion amongst the various specialists and expert advisors who have given evidence and advice about what constitutes an appropriate standard of care in this situation.

On the one hand, Dr D considers that Dr B's advice to the clinical team that platelets were not immediately required was inappropriate and Dr N believes that Dr B should have given the clinical team forceful advice that platelets were required.

On the other hand, two expert advisors, Dr E and Dr Baker, believe that Dr B's decisions about platelet transfusion and the information Dr B provided to the surgical team were appropriate and consistent with an acceptable standard of care in the circumstances.

I am satisfied from the advice of these two experts that there is a responsible body of medical opinion that would regard Dr B's decisions in relation to platelet transfusion and the information Dr B provided to the surgical team as proper in the circumstances.

In light of this, I have formed the view that Dr B's decisions in relation to platelet transfusion and the information Dr B provided to the surgical team were reasonable, and that Dr B did not breach his duty of care under the Code.

Other comments

One issue that has been much commented upon by various specialists and experts in this case is the question whether Miss A's death was inevitable or whether some of the interventions that have been suggested in hindsight may have saved her life.

As Health and Disability Commissioner, this is not a matter that is within my jurisdiction to make any finding on.

However, recognising that this matter is of critical importance to Miss A's family and to those involved with Miss A's care, my advisor Dr Baker has offered his own perspective on this matter. He states that whilst neutropenic sepsis (infection in the presence of a low white blood cell count) is common in patients with acute leukaemia, *Clostridium septicum* ("an unusually severe form of infection") is not. Although neutropenic sepsis infections can be fatal, young patients generally cope reasonably well, provided that appropriate antibiotics and supportive care are administered. In contrast, he comments:

"*Clostridium septicum* is a very rare and unusually severe form of infection in this setting and her unexpected, rapid deterioration after being apparently quite stable is, in my (fairly extensive) experience of managing neutropenic sepsis, unusual."

Recommendations

District Health Boards
I recommend that all District Health Boards:

- develop and implement guidelines recommending that registrars discuss all new paediatric acute leukaemia patients with the on-call senior paediatrician and haematologist or the regional paediatric haematologist/oncologist
- remind all consultants of the importance of clarifying their expectations about being contacted by registrars when on call.

Colleges
I recommend that the Royal College of Pathologists of Australasia and the Royal Australasian College of Physicians highlight this case as a case study in a College publication and use it in their registrar training programmes.

Follow-up actions

- A copy of this report will be sent to the Medical Council of New Zealand.

- A copy of this report, with details identifying the parties removed, will be sent to the Royal College of Pathologists of Australasia, the Royal Australasian College of Physicians, and the Chief Medical Officer of all District Health Boards, and placed on the Health and Disability Commissioner website, www.hdc.org.nz, for educational purposes.

Appendix 1: References

British Committee for Standards in Haematology (2003) Guidelines for the use of platelet transfusions. *British Journal of Haematology*, **122**, 10-23.

Heal J M & Blumberg N (2004) Optimizing platelet transfusion therapy. *Blood Reviews*, **18**, 149-165.

Kitchens C S. Disseminated Intravascular Coagulation. In Kitchens C S *et al*, (Eds): Consultative Hemostasis and Thrombosis. Philadelphia, W.B. Saunders Company, 2002, pp. 165-178.

Schiffer C A, Anderson K C, Bennett C L *et al* (2001) Platelet transfusion for patients with cancer: clinical practice guidelines of the American Society of Clinical Oncology. *Journal of Clinical Oncology*, **19**, 1519-1538.

Appendix 2: Material Studied

"A" **Health & Disability Commissioner's provisional breach opinion** dated 23/09/04 in respect of [Dr B's] failure to consult with the haematologist on call about [Miss A's] blood film results.
(14 pages: 001-014)

"B" **Letter from [Dr B's] solicitor**) dated 14/10/04 responding to the provisional breach opinion listed at "A" above, and annexing:
(i) **letter** dated 12/10/04 from [**Dr E]**
(5 pages: 016-020)

"C" **Letter from [Dr B's] solicitor]** dated 10/02/04 (received prior to the Commissioner issuing provisional opinion) making submissions on behalf of [Dr B] and annexing:
(i) **letter** dated 5/02/04 from [**Dr B]** with curriculum vitae
(ii) **report by [Dr E]** for ACC Investigation dated 21/08/03
(20 pages: 021-040)

"D" **Letter from the** [**Mr and Mrs A's solicitor]** dated 24/06/04 responding to a previous provisional opinion issued by the Health & Disability Commissioner dated 3/06/04 which proposed taking no further action against [Dr B] (this opinion is not included amongst the bundle of supporting information provided), which **includes reported comments by [Dr D]** and also annexes:
(i) notes from a medical literature search
(17 pages: 041-057)
Letter from [Mr and Mrs A's solicitor] dated 3/09/03 including **reported comments by [Dr D].**
(2 pages: 057A-057AA)

"E" **[Dr E's]:**
(i) Report for Inquest into Death of [Miss A]
(ii) Transcript of evidence given to Coroner's Court
(28 pages: 058-085)
Note: in addition, a **letter from [Dr E]** is listed above at "B" as an annexure and a **report prepared by [Dr E]** for ACC is listed above at "C" as an annexure

"F" **[Dr D's]:**
(i) Medical Report and Opinion presented at Inquest into Death of [Miss A]
(ii) Transcript of evidence given to Coroner's Court
(24 pages: 086-109)
Note: **additional comments by [Dr D]** are reported in the letters from [Mr and Mrs A's solicitor] listed above at "D"

"G" **[Dr B's]:**
(i) Report … about [Miss A] for [Dr …], Chief Medical Officer at [the first public hospital]

(ii) Transcript of evidence given to Coroner's Court
(iii) Brief of evidence for Coroner's Court
(23 pages: 110-132)

Note: in addition, a **letter from [Dr B]** to the Health and Disability Commissioner dated 5/02/04 is listed above at "C" as an annexure to a letter from [Dr B's] solicitor.

"H" Consultant hematologist at [the first public hospital], [Dr N's]:
(i) Report … about [Miss A] for [Dr …], Chief Medical Officer at [the first public hospital]
(ii) Transcript of evidence given to Coroner's Court
(10 pages: 133-142)

"I" Pathologist, [Dr S's]:
(i) Post mortem report on [Miss A]
(ii) Transcript of evidence given to Coroner's Court
(10 pages: 143-152)

"J" Haemotology laboratory technician, [Ms M]:
(i) Transcript of evidence given to Coroner's Court
(ii) Brief of evidence for Coroner's Court
(7 pages: 153-159)

"K" Anaesthetic registrar, [Dr H's]:
(i) Letter to Health and Disability Commissioner dated 5/01/04
(ii) Report … on [Miss A]
(iii) Transcript of evidence given to Coroner's Court
(iv) Brief of evidence given to Coroners Court
(26 pages: 160-185)

"L" Surgical registrar, [Dr L's]:
(i) Report …
(3 pages: 186-188)

"M" Surgical registrar, [Dr G's]:
(i) Letter dated 16/03/04 to Health and Disability Commissioner
(ii) Record for patient notes …
(iii) Operation note …
(5 pages: 189-193)

"N" Chief Medical Officer [the DHB], [Dr …'s]:
(i) Transcript of evidence given to Coroner's Court
(7 pages: 194-200)

"O" Clinical leader, [Dr …]:
(i) Critical incident report [Miss A]

(2 pages: 201-202)

"P" Incident Report by …], Unit Manager, …
(1 page: 203)

"Q" Coroner's:
(i) decision …
(ii) finding …
(7 pages: 204-210)

"R" [the DHB's] briefing notes for critical incident
(9 pages: 211-219)

"S" [the DHB] internal memorandum … from [the Chief Medical Officer] to various persons including [Clinical Leader] re [Miss A]
(2 pages: 220-221)

"T" [the diagnostic laboratory's] internal memorandum … from […] to [Dr …]
(1 page: 222) (*Note*: that page/s appear to be missing but we do not have these on file)

"U" [the District Health Board's] internal memorandum … to [the Chief Medical Officer] from […], Clinical Leader and […], CPG Manager re [Miss A]
(1 page: 223)

"V" [the District Health Board's] letter to the Coroner … from [the Chief Medical Officer]
(5 pages: 224-228)

"W" [the District Health Board's] internal memorandum … from […] to [the Chief Medical Officer]
(1 page: 229)

"X" Medical notes for [Miss A's] admission to [the first public hospital] …
(50 pages: 230-279**)**

"Y" Previous medical notes for [Miss A] in respect of earlier hospital admissions and treatment
(6 pages: 280-285)

"Z" Consultant surgeon, [Dr F's]:
(i) Report on [Miss A] …
(ii) Transcript of evidence given to Coroner's Court
(iii) Brief of evidence for Coroner's Court
(iv) Letter to Health & Disability Commissioner 28/01/04
(14 pages: 286-299)

Emergency Department Consultant, [Dr J]:
(i) Report on [Miss A] (undated & missing 1st page/s)
(2 pages: 300-301)

Anaesthetic Consultant, [Dr J's]:

(i) Letter re [Miss A] to […], [the first public hospital] …
(2 pages: 302-303)

Appendix 3: Summary of Events

[Miss A] died in [the first public hospital] at around 3.55 am on ….

The events on the night of [Miss A's] death

Emergency Department admission
[Miss A] had arrived by ambulance at the Emergency Department at 10.04 pm on the previous night, …, after the after-hours GP service doctor had contacted **surgical registrar [Dr G]** to arrange [Miss A's] admission to [the first public hospital]. [Miss A] had a two-day history of feeling unwell with abdominal pain and vomiting.

Upon arrival at [the first public hospital], [Miss A] was examined at 10.09 pm by the **Emergency Department consultant, [Dr J]**. [Dr G], the surgical registrar, arrived at the Emergency Department at approximately 10.20 pm, having been notified of [Miss A's] arrival.

[Miss A] was ill (triage category 2, requiring treatment in 10 minutes). Although alert and orientated, she was extremely distressed with pain. She exhibited signs of sepsis and shock, with cold, mottled extremities, a sign of "peripheral shutdown". [Dr J] diagnosed septicaemia, complicating her primary illness. He commenced resuscitation with intravenous infusions, inserting one in each arm, intravenous antibiotics for the infection and morphine to control her pain. He took blood for culture, full blood count, urea, and electrolyte analysis. [Miss A] received two litres of fluid intravenously while she was in the Emergency Department. Her condition improved with a rise in blood pressure, decrease in heart rate (from 140 to 120) and reduction in pain. The preliminary blood test result was reported to the Emergency Department as neutrophils 5.53 (normal range 2.00-7.50) at 10.51 pm. No platelet count was provided as the technician was checking the results.

Once [Miss A] was stable, Drs [J] and [G] attempted to find the cause of her illness. An abdominal ultrasound revealed free fluid in the abdomen and a complex mass in the right groin area. [Dr G] made a preliminary diagnosis of appendicitis (with possibly a ruptured appendix) and peritonitis. [Dr G] discussed [Miss A] with the consultant surgeon on call, [Dr F], shortly before 11 pm, and with the **senior house officer in anaesthetics, [Dr H]**. [Dr H] consulted the **anaesthetic consultant, [Dr K]**, to tell him of three surgical cases pending, one of whom was [Miss A]. All agreed that [Miss A] should proceed to theatre for an urgent appendectomy under general anaesthetic.

Theatre
The theatre team were **[Drs G and L], surgical registrars,** and **[Dr H], the senior house officer in anaesthetics.** [Dr H] commenced [Miss A's] anaesthetic at 11.35 pm and the operation commenced shortly before midnight. [Dr G] performed the operation assisted by [Dr L].

The **technician working in the haematology department** that night was **[Ms M]**. She received [Miss A's] blood sample from Emergency Department for full blood count. Ms M put the blood specimen through the analyser and noted that the platelet count was low at 49

(a normal count is 150-400). She checked the specimen for clotting or "clumping", which can account for false low platelet results. [Ms M] sent the blood test results through to the Emergency Department but she did not include the platelet count. Because the platelet count was low she made a blood film which, when stained, revealed blast cells.

[Dr B], the pathology registrar, was on call that night for haematology and the blood transfusion service. [Dr B] was able to cover haematology on call because he had worked in haematology for one to two years and had satisfied the consultant haematologist that he was competent to interpret changes in blood films, bone marrow and coagulation abnormalities and appropriately prescribe blood products. [Dr B] was in his seventh year of pathology studies.

Phone call from [Ms M] to [Dr B]
[Ms M] paged [Dr B] just before midnight to discuss the results of [Miss A's] blood test and [Dr B] phoned her back from his home. [Ms M] told [Dr B] the blood test results and that she thought the results indicated that [Miss A] had leukaemia.

Neither [Dr B] nor [Ms M] was aware when they spoke that [Miss A] had been taken to theatre for surgery. [Dr B] told [Ms M] to phone the Emergency Department and report that [Miss A] had "a population of cells with primitive features" and that further tests would be conducted in the morning. [Dr B] gave evidence at the Coroner's hearing that he wanted the Emergency Department doctors to get this information quickly because there was a risk that [Miss A] might be discharged from the Emergency Department before the abnormal tests were fully investigated and he considered that it was essential that she be admitted to hospital.

[Dr B] gave evidence at the Coroner's hearing that the presence of blast cells in a peripheral blood sample is diagnostic of leukaemia, that blast cells should only be found in bone marrow and that confirmatory tests would require bone marrow samples. He stated that he would previously have gone to the hospital and taken a bone marrow sample but that these specialist tests were now only done at [the second public hospital]. Dr B anticipated that [Miss A] would be transferred to [the second public hospital] the following morning.

[Ms M] phoned the Emergency Department and spoke to [Dr J] informing him that [Miss A] had a population of primitive cells in the blood, and of her neutrophil and platelet counts. [Dr J] later recalled that [Ms M] referred to "leukaemia" but wondered whether infection could be the cause of the abnormal results. [Dr J] informed [Ms M] that [Miss A] was in theatre and asked [Ms M] to contact the theatre team directly.

[Ms M] telephoned the theatre and spoke to [Dr H], the senior house officer in anaesthetics, about the results, and [Dr H] advised the surgeons [Drs G and L] that the blood tests revealed a low platelet count and the presence of blast cells. [Dr G] interrupted surgery so he could phone to discuss the results with **[Dr F], the consultant surgeon on call**.

Phone call between [Dr H] (from theatre) and [Dr B]
[Dr H] telephoned [Dr B] about the significance of [Miss A's] blood results. [Dr B] was surprised by the call because he did not know [Miss A] was in theatre. [Dr B] told [Dr H] that the blood results were consistent with acute leukaemia and explained that a platelet count of 49 was low and that for *elective* surgery it was preferred that a patient have a platelet count above 100. [Dr B] asked about [Miss A's] coagulation status and [Dr H] replied that she had not bled excessively during surgery, experienced no complications and was haemodynamically stable at the time.

[Dr B] advised [Dr H] that [Miss A] should be closely monitored for bleeding and that, depending on her clinical situation, platelets were available if required. [Dr B] informed [Dr H] that the blood film would be reviewed first thing in the morning. [Dr B] did not discuss where [Miss A] should be monitored postoperatively.

[Dr H] recorded the following in [Miss A's] records:

"Contacted by haematology tech + Plt (platelets) = 49"

……

"? underlying haematological disorder – will review tomorrow am. If requires plts, can be provided. DO NOT DISCHARGE BEFORE HAEMATOLOGY HAVE BEEN CONTACTED AGAIN RE BLOOD FILM"

[Dr G] phoned [Dr F], the consultant surgeon on call, to discuss the blood results. They discussed [Miss A's] low platelet count, haemostasis, and the unexpected inflammatory changes [Dr G] had found during surgery. On completing his call to [Dr F], [Dr G] asked Dr H to give the additional antibiotic, Gentamycin. [Dr F] did not advise [Dr G] to give [Miss A] a blood or platelet transfusion because there was no clinical evidence of bleeding or clotting problems; Dr B had not recommended a platelet transfusion and [Dr F] did not consider a transfusion necessary at that point. [Dr F] was not aware that [Dr B] had not discussed the blood results with the haematology consultant.

[Dr G] performed a routine appendectomy, assisted by [Dr L]. [Dr G] found that [Miss A] had a moderately inflamed appendix and widespread inflammatory changes within the abdomen. [Dr G] was not convinced that the severity of [Miss A's] condition in the Emergency Department was explained by the surgical findings. When [Dr H] gave him the haematology report, he again thoroughly explored the surgical area but could find no other abnormality.

[Dr G] knew the blood results could suggest an underlying haematological malignancy which should be investigated postoperatively. There was no excessive bleeding during surgery or from the wound and [Dr H] found no evidence of bleeding when he removed the endotracheal tube at the completion of the operation. Before [Miss A] left theatre, a urinary catheter was inserted to monitor her urinary output.

[Drs G and H] discussed where [Miss A] should be monitored following surgery. The High Dependency Unit had no empty beds and, as Miss A had had no complications during surgery and showed no evidence of bleeding, they considered that she could be nursed in the paediatric ward.

Post-operative
[Miss A] was transferred to the Post Anaesthetic Care Unit where she remained for approximately 30 minutes during which time Dr H reviewed her twice. The nurse on duty was [Mr O]. [Miss A's] heart rate and temperature remained elevated and she was dehydrated, as evidenced by her low urinary output, but otherwise she remained stable. [Dr H] was happy with her progress and advised [Mr O] that she could be transferred to the paediatric ward. [Mr O] rang the ward at 1.40 am and [Miss A], accompanied by [Mrs A], arrived in the paediatric ward at about 2 am.

Three nurses were on duty in the paediatric ward that night: registered nurses [Mr P] and [Ms Q], and enrolled nurse [Ms R]. [Ms R] went to the Post Anaesthetic Care Unit to receive the handover report and transfer [Miss A] to the paediatric ward.

[Dr L] reviewed [Miss A] in the paediatric ward at 2.10 am. He noted that she was alert and feeling better, with a soft abdomen, stable observations and no sign of excessive bleeding. [Mr P] took [Miss A's] observations at 2.30 am and secured a splint to her arm to help the intravenous flow. [Miss A's] temperature remained elevated (38 degrees C) and pulse fast (140bpm) and her urinary output was good (35ml that hour). [Miss A's] limbs remained slightly mottled in appearance but her "capillary return was good and hands warm".

At about 2.30 am [Mrs A] heard [Miss A] making heavy breathing, sighing noises and asked [Mr P] about it. He recalled hearing what he described as normal post-anaesthetic breathing. [Mrs A] went to sleep on a stretcher prepared for her at about 3 am.

At 3 am [Mr P] checked [Miss A] again and reported her unchanged. He took her observations: blood pressure 112/62, pulse 132, respiration 22 and oxygen saturation 97%. There was no further ooze from her wound and her abdomen had the same appearance and feel as before. At 3.30 am [Mr P] checked [Miss A] again. She remained unchanged. [Dr L] phoned the ward soon after 3.30 am and was told that [Miss A] appeared satisfactory. [Mr P] assured [Mrs A] that [Miss A's] observations were stable and that he would check her again shortly.

Soon after, [Miss A's] IV alarm sounded and [Ms R] went into [Miss A's] room. [Ms R] found the IV fluid bag empty, but was more concerned about Miss A's appearance and immediately reported to Mr P. [Miss A] had suffered a cardiac and respiratory arrest at about 3.55 am. Attempts at resuscitation were unsuccessful.

The following morning
[Dr B] attended at the hospital the following morning prior to catching a plane to go on leave. He advised through his lawyer that he learned of [Miss A's death] when he was at the hospital that morning and that he then tried unsuccessfully to contact the person he understood (incorrectly) to be the haematology consultant at that time, and also the haematology registrar.

Post mortem examination

A post-mortem examination was carried out by the **Clinical Director of Anatomical Pathology, [Dr S]**, who reported:

"The deceased [Miss A] died at [the first public hospital] on …, death being due to clostridium septicum septic shock complicating necrotising neutropenic typhlitis and oesophagitis in association with acute leukaemia and haemorrhagic diathese."

Coroner's Inquest

The Coroner held an inquest into [Miss A's] death and produced a decision on ….

Several expert medical witnesses gave evidence at the Coroner's hearing.

The haemotologists who appeared at the inquest were:

- **[Dr N]**, the consultant haematologist on call at [the first public hospital] on the night [Miss A] was admitted;
- **[Dr D]**, Consultant Haematologist;
- **[Dr E]**, Paediatric Haematologist and Clinical Director.

No discussion with on call consultant haematologist
These experts disagreed about whether [Dr B] was in breach of good medical practice and acted appropriately in failing to discuss [Miss A's] case with the on call consultant haematologist.

[Drs D and N] were both critical of Dr B.

[Dr E], however, took the view that [Dr B's] decision was justifiable and appropriate. However, Dr E's report to the Coroner also expressed the view that "*for the future*" it would be "*wise and recommended*" for the on call registrar to discuss newly diagnosed paediatric oncology patients with, amongst others, the on call haematologist (in case of leukaemia). [Dr E] stated that this recommendation was for the purpose of "*sharing the burden of responsibility*" and so that "*the benefit of collective experience and specialist knowledge can be utilised*".

Other actions by [Dr B]
There was also disagreement amongst these experts about whether other actions by [Dr B] on the night were in breach of good medical practice.

Coroner's decision
The Coroner determined that no actions by any of the hospital staff caused or contributed to [Miss A's] death.

The Coroner made no finding as to whether [Dr B] (or any of the other medical professionals involved) adopted correct medical procedures on the basis that he was not prepared to find that incorrect procedures were employed where there was a genuine disagreement among the medical profession as to what are the correct procedures in a given situation.

The Coroner stated that if he had to make a decision between the evidence of [Dr D] and [Dr E], then he would prefer the evidence of [Dr E] on the basis that [Dr E's] evidence was more focused on what caused or contributed to [Miss A's] death rather than on what good medical practice requires.

HDC Investigation

On … the Commissioner received a complaint from [Mr C], [Mr and Mrs A's] solicitor about the events leading to [Miss A's] death. Once the Coroner's inquest had been completed and the decision had been reported on …, [Mr C] advised the Commissioner that [Mr and Mrs A] had a number of unresolved issues and an investigation was commenced on …. A provisional decision was reached on 3 June 2004 to take no further action, but [Mr C] replied on 24 June 2004 with further comments provided by [Dr D], including the results of a medical literature search. Having reviewed all of the information, including [Dr D's] further comments, the Commissioner sent [Dr B] a provisional breach opinion for his comment on 23 September 2004, relating to his failure to consult with the haematologist on call on the night of [Miss A's] death. [Dr B's solicitor] responded on 14 October, with a further letter from [Dr E], dated 12 October 2004, submitting that the provisional breach opinion was wrong for various reasons outlined in the letter. The Commissioner then sought a further opinion, which has led to this report. On 9 November 2004 further letters were sent from [Dr B's lawyer] and [Dr B], critical of the conclusions drawn from the literature review undertaken by Dr [D].