CORONERS ACT, 1975 AS AMENDED

*SOUTH*  *AUSTRALIA*

# FINDING OF INQUEST

*An Inquest taken on behalf of our Sovereign Lady the Queen at Adelaide in the State of South Australia, on the 15th and 16th days of December 2004 and the 18th day of January 2005, before Wayne Cromwell Chivell, a Coroner for the said State, concerning the death of Dorothy Alberta Squires.*

*I, the said Coroner, find that Dorothy Alberta Squires aged 90 years, late of 3 Bristol Place, Glenelg, South Australia died at Flinders Private Hospital, Bedford Park, South Australia on the 29th day of September 2003 as a result of an incompatible blood transfusion resulting in haemolysis and multi-organ failure complicating an acute myocardial infarction. I find that the circumstances of her death were as follows:*

## 1. Introduction

1.1. Mrs Dorothy Squires was a 90 year old lady who was a patient at the Flinders Private Hospital (FPH) on 26 September 2003.

1.2. Mrs Squires had several previous admissions during September of that year. Her final admission was during the afternoon of 24 September 2003. She was suffering unstable angina and a recent myocardial infarction. She was admitted and stabilised with medication, however she continued to suffer chest pain. It was concluded that she had lapsed into cardiogenic shock, she had low blood pressure, shortness of breath and congestive cardiac failure.

1.3. On the morning of 26 September 2003 a coronary angiography was performed and an intra-aortic balloon pump (IABP) was inserted to improve myocardial perfusion. Dr Robert Minson, Cardiologist, performed this procedure.

1.4. Mrs Squires was admitted to the Intensive Care Unit (ICU) at about 4pm that afternoon. Blood tests disclosed that her haemoglobin level was low, and so Dr Celine Tan, a staff medical officer in the ICU, directed that she should receive a blood transfusion.

1.5. A blood transfusion was performed by Registered Nurse Merinda Green at around 8pm. At around 9pm, it was discovered that Mrs Squires had been transfused with an incorrect blood pack. She was receiving A- blood when her blood group was O+. The transfusion was immediately ceased, and a further transfusion commenced with the correct blood.

1.6. Unfortunately, Mrs Squires developed progressive coagulopathy and anaemia, and during Saturday 27 September 2003, multi-organ failure became apparent.

1.7. As Mrs Squires, in consultation with her relatives and medical staff, had directed that she not receive aggressive resuscitation measures, her condition was treated conservatively and she died at 11:30am on Monday, 29 September 2003.

## 2. Cause of death

2.1. A post-mortem examination of the body of the deceased was performed by Dr A D Cala, Forensic Pathologist, at the Forensic Science Centre on 30 September 2003.

2.2. Upon examination of the heart, Dr Cala found evidence of a postero-lateral acute myocardial infarction, 'which appeared possibly several days old' (Exhibit C14, p3). In oral evidence, Dr Cala agreed that this finding was consistent with Mrs Squires' clinical history that she was suffering an myocardial infarction upon admission on 24 September 2003, five days before she died (T75).

2.3. Other significant findings were:

- Severe coronary atherosclerosis of all three coronary vessels, but no evidence of acute thrombosis;
- Focal areas of ulceration throughout the transverse colon to the rectum which, on microscopic analysis showed transmural infarction of the tissue, and evidence of small thrombi in many of the small arteries and arterioles. Dr Cala commented:

> 'Appearances are of ischaemic necrosis secondary to multiple thrombi, presumably from a myocardial source.'
>
> (Exhibit C14, p9)

- A primary adenocarcinoma of the descending colon infiltrating the submucosa but which had not spread into surrounding tissue;
- The left kidney was mottled in appearance suggesting some deterioration in function;
- The bladder was haemorrhagic, consistent with the finding of blood in the urine;
- The liver was markedly congested but this is a common finding in deceased persons;
- The lungs were congested but this is also a common finding.

(Report - Exhibit C14)

2.4. Dr Cala said that although there were some signs of multi-organ failure, particularly in relation to the infarction of the colon and the mottling of the kidney and the haemorrhagic bladder, these were not entirely clear and some if not all of these conditions could have been caused by Mrs Squires' very serious heart condition (T84).

2.5. However, Dr Cala expressed the very clear view that the incompatible blood transfusion, in a patient whose health was already severely compromised by a myocardial infarction and haemorrhagic shock, remained a significant cause of Mrs Squires' death (T85).

2.6. He pointed to the fact that Mrs Squires' clinical condition deteriorated significantly following the transfusion, and continued to deteriorate until she died. Dr Cala had read the FPH clinical record and said that the deterioration in Mrs Squires' condition was proximate to the incompatible blood transfusion and, in his view, related to it.

2.7. This evidence is supported the evidence of Dr Phil Tideman, Mrs Squires' Cardiologist:

> 'On Saturday September 27, 2003 I met with Dr Alnis Vedig, Head of ICU, and the relatives of Dorothy Squires. Due to Dorothy being unable to communicate her treatment was discussed with her relatives. Her condition had worsened with multi organ failure commencing. On her behalf they expressed no wishes for life support systems to be used. Dorothy's treatment level was reduced.
>
> On Sunday September 28, 2003 Dorothy's condition had further deteriorated, her multi organ failure continuing. The intra-aortic balloon pump was removed, prior to Dorothy's transfer to a general treatment ward, 4 South. Upon her transfer no further acute treatment measures were planned.'
>
> (Exhibit C3a, p3)

2.8. Further, Professor Alnis Vedig, the Head of the FPH ICU said:

> 'On the morning of Saturday, September 27, 2003 Mrs Squires' balloon pump was momentarily turned off, this showed her own blood pressure to be very low. Her urinary output was zero. Analysis of blood samples taken from Mrs Squires showed evidence of haemolysis, being the natural destruction of A- red blood cells which had been mistakenly given to her. She remained in the ICU during the day, with her cardiac condition progressively worsening.
>
> On the morning of Sunday, September 28, 2003 the output level of Mrs Squires' balloon pump was turned down very low. She was given morphine and sedated. Her blood pressure improved to 90/105 with virtually no assistance from the pump. This apparatus was removed around lunchtime. I examined Mrs Squires in the afternoon and found her to be clinically very tender with possible schemic bowel. Multi organ failure was beginning. '
>
> (Exhibit C5a, p3)

2.9. Dr Tideman has written a further report to the statement he gave police during the initial investigation. In that report, he reviewed Mrs Squires' clinical condition and commented:

> 'In a 90 year old woman with the described coronary anatomy in cardiogenic shock requiring intra-aortic balloon pump stabilisation of her haemodynamics, her mortality without coronary artery bypass surgery would have been almost certainly 100%. That is, she would not have left hospital from this admission.
>
> With possible coronary artery bypass surgery given that she was technically suitable for grafting of the LAD and the right coronary artery her mortality rate would probably have been in the order of at least 50%. Given that she had previously refused to consider coronary artery bypass surgery as an option of treatment at the age of 90, this latter assessment is somewhat academic. She was not suitable for endovascular revascularization procedures such as angioplasty or stenting.'
>
> (Exhibit C3b)

2.10. On the basis of Dr Tideman's further report, it is clear that Mrs Squires was extremely unwell upon admission to hospital on 24 September 2003, and that it was almost certain that she would not have left the hospital. However, it is also clear that the incompatible blood transfusion, with consequent haemolysis (breakdown of red blood cells) and multi-organ failure, placed an extra strain upon her already highly compromised cardiovascular system, and accelerated her death.

2.11. Accordingly, I accept Dr Cala's evidence as to the cause of death, and find that Mrs Squires died as a result of an incompatible blood transfusion resulting in haemolysis and multi-organ failure complicating an acute myocardial infarction.

## 3. Background

3.1. RN Green has been a Registered Nurse since 1996 and holds a Graduate Diploma in Critical Care Nursing.

3.2. RN Green told me that she had worked in various hospitals since she became qualified, and that they had all had a standard protocol for blood transfusion which involved checking the correctness of the blood pack to be transfused and the identity of the patient, at all times in the presence of another registered nurse, and in the presence of the patient. This is consistent with the protocol at FPH headed 'Blood Component Transfusion', paragraphs 6-11 inclusive, which reads as follows:

> '6. Collect the unit of blood from the blood fridge in the Pathology room adjacent Recovery, observing the appropriate checking out procedure as per blood and blood products record policy.
>
> 7. Check that the information on the unit of blood cross-matched in Pathology refrigerator matches the information on the cross-matching transfusion report from Pathology and with the information in the Blood dispatch Record in respect of:
>
> a) Patient's surname & given names
> b) Patient's date of birth
> c) Donor blood group
> d) Date of collection
> e) Patient's blood group
> f) Donor number
> g) Donor antibody screening (on the blood unit)
>
> 8. Sign the Blood Dispatch Record, filling in the appropriate information (see Blood and Blood Products Record Policy.
>
> 9. Observe the bedside checking procedure:
>
> i. two nurses, one being a Registered Nurse;
>
> ii. check the label on the blood unit with the blood transfusion report from Pathology in respect of those above;
>
> iii check the patient's identity band and allergy band and verbally, if possible, ascertain the patient's name and date of birth.
>
> 10. Any discrepancies are immediately reported to Pathology. Blood not to be commenced until discrepancies clarified.
>
> - If no discrepancies are found, and the checking procedure is complete, the unit may be commenced, and the two staff members checking the blood unit must initial or sign the Blood Transfusion Report against the appropriate unit number. They must also sign the IV fluid order chart.
>
> 11. Connect the blood unit to the giving set and commence the transfusion.'
>
> (Exhibit C11b, p2)

3.3. RN Green said that she filled out a Southpath pathology request form at around 6:50pm for two units of red blood cells (the form is Exhibit C12a). The form has a sticker attached which records Mrs Squires' name, address, date of birth and patient number which RN Green must have seen when she filled out the form.

3.4. After forwarding the form and telephoning Southpath to alert them, RN Green took a meal break and returned at about 7:30pm. By this time, Dr Tan had inserted a jelco for intravenous access in preparation for the transfusion. Dr Tan was present with her, as was Mrs Squires' niece and her husband. The group were discussing Mrs Squires' wishes in relation to whether she wished to have resuscitation measures taken should they become necessary. Recognising this was a sensitive and distressing topic, RN Green decided not to enter the bay.

3.5. At around this time, a female courier from Southpath entered the ICU and placed two packs of blood in the refrigerator. She asked to be directed to the doctor to sign for the delivery. Assuming that the blood was for her patient, RN Green directed her to Dr Tan. She went to the refrigerator and collected one of the blood packs and the pink Southpath form. The form and the blood pack were in the name of Hazel Smith (Mrs Smith was apparently also a patient at FPH, but not a patient in Intensive Care Unit). [redacted]
From this point onwards, RN Green formed the belief that her patient's name was Hazel Smith and not Dorothy Squires.

3.6. RN Green took the blood pack and form back to the ICU (having completed the transfusion register), but on her returned noted that Dr Tan and the family were still present. She looked for the Nursing Team Leader, RN Adrian Johnson, but he was busy. She went to the next bay where RN Cynthia Pope was attending to her patient. RN Pope agreed to assist RN Green in the cross-checking procedure.

3.7. The two RNs checked the details on the blood pack against those recorded on the pink report form and noted that they corresponded. RN Pope signed the pink form (Exhibit C11a) and then returned to her patient because he required urgent attention.

3.8. It was at this point that RN Green departed from appropriate procedure. What should have happened was that the cross-checking should have taken place in the presence of Mrs Squires and in the presence of the two RNs. Because RN Pope was busy, RN Green went off to collect the 'giving set', and then returned to her bay by which time

Dr Tan had left. She overlooked the fact that the second part of the cross-checking procedure, namely checking the identity of the patient in the presence of two RNs, had not been completed. She proceeded to set up the blood transfusion and connected it, commencing at about 8pm.

3.9. At around 9pm, when the first blood pack had almost all been transfused, RN Green asked RN Johnson to collect the second unit from the refrigerator to continue the transfusion. RN Johnson went to the refrigerator and noted that there were still two units of blood there in the name of Mrs Squires.

3.10. He then checked the details on the form, and the unit of blood which had been transfused, and quickly realised that the wrong blood had been used. He immediately clamped the line and advised Dr Tan of what occurred (Exhibit C6a, p3).

## 4. Issues arising at inquest

4.1. On the evidence before me, there is no doubt that RN Green failed to comply with the protocol for blood transfusions (Exhibit C11b) which requires that two nurses, at least one being a Registered Nurse, should check the patient's identity band and allergy band and verbally, if possible, ascertain the patient's name and date of birth. If she had done so, it would have quickly become apparent that the label on the blood unit, the name on the blood transfusion report and Mrs Squires' name were different. RN Green did not suggest that she was unaware of the procedure, or that she misunderstood it in any way. She simply overlooked the checking requirement before commencing Mrs Squires' transfusion.

4.2. I heard evidence from Ms Heather Messenger, who was the Assistant Director of Nursing at FPH on 26 September 2003 and is now the Director of Nursing.

4.3. Ms Messenger said that even though there was no deficiency in the old Procedure, she initiated a review of the procedures for blood transfusions following this tragic incident. A new Procedure has been developed, and came into effect on 1 March 2004 (Exhibit C13).

4.4. That Procedure is substantially similar to the old one, except that it is framed in much clearer and more detailed terms. For example, in the preamble to the policy, it is stated:

> 'The major risk of morbidity or mortality associated with blood administration remains due to ABO incompatibility from a procedural or clerical error. Worldwide reports show

that incompatible transfusion resulting in deaths can result from errors at any stage of the transfusion process. These errors can be avoided if correct patient identification, and checking procedures are strictly followed at all stages of the transfusion process including but not inclusive to:

- Hospital admission details;
- Pre-transfusion specimen sampling;
- Laboratory testing and product allocation;
- Removal from monitored blood refrigerators;
- Compatibility paperwork/blood product checks;
- Patient identity checks prior to administration.

At each stage of the process patients **shall be asked, where possible to:**

- State and spell their surname;
- State and spell any given names;
- State their date of birth.

**If any detail is incorrect the process must not proceed until correct patient details are reflected on all paperwork.**

…'

(Exhibit C13, p2)

4.5. In particular, the Procedure requires:

'ADMINISTRATION AND BEDSIDE CHECKING PROCEDURE

…

8. **Take written patient details (the IV order sheet is the first preference) to the blood fridge (located in Recovery/ICU) including:**
   - Patient surname;
   - Patient given names;
   - Date of birth;
   - Medical Record Number (where applicable eg. blood sourced from Southpath)

   **Collect the unit of blood from the blood fridge observing the appropriate checking out procedure** as below and as per FPH BLOOD AND BLOOD PRODUCTS RECORDS policy.
9. **Check that the information on the unit of blood cross-matched** in the blood refrigerator matches the information on the cross-matching transfusion report from Pathology and with the information on the Blood Dispatch Sheet in regards to:

| | |
|---|---|
| a) Patient's surname & given names | f) Expiry of blood pack |
| b) Patient's date of birth | g) Patient's blood group |
| c) Patient's medical record number (applicable for Southpath blood only) | h) Donor number |
| d) Donor blood group | i) Donor antibody screening (on the blood unit) |

| | |
|---|---|
| e) Date of collection | j) Expiry of cross match sample (applicable 72 hours after administration of the first unit) |

10. **Prior to transfusion, components should be inspected visually** (refer to section 1, 'Storage and Collection of Blood and Blood Products from Blood Fridges at FPH' point 6 in this policy).
11. **Sign the Blood Dispatch Record (refer to Appendix B)**, documenting the appropriate information (refer to FPH BLOOD AND BLOOD PRODUCTS RECORD policy). Ensure the blood fridge door is securely fastened as the integrity of remaining blood relies on constant refrigeration at 4ºC.
12. **Perform the bedside checking procedure**:
    i. Check the Medical Practitioner's written order for blood products;
    ii. Checking to be performed by one Registered Nurse and a second nurse or Medical Practitioner where applicable;
    iii Check the label on the blood unit with the blood transfusion report from Pathology in regards to:

| | |
|---|---|
| a) Patient's surname & given names | f) Expiry of blood pack |
| b) Patient's date of birth | g) Patient's blood group |
| c) Patient's medical record number (applicable for Southpath blood only) | h) Donor number |
| d) Donor blood group | i) Donor antibody screening (on the blood unit) |
| e) Date of collection | j) Expiry of cross match sample (applicable 72 hours after administration of the first unit) |

    iv. **Check the FPH patient's identification band and allergy band and verbally**, if possible, ask the patient to state/spell their surname first names and date of birth – confirm all details with the blood pack and compatibility report;
    v. **Any patient who cannot verbalise shall have a securely attached FPH patient identification band**, if this band is not present the transfusion shall not proceed until confirmation of identity is gained and a band applied;
    vi Check that any special requirements are met (CMV Negative, irradiated, filtered, leucodepleted, washed or warmed).
13. **DO NOT COMMENCE THE BLOOD** until discrepancies are clarified. Any discrepancies shall be reported immediately to the appropriate transfusion provider.

…'

(Exhibit C13, p5)

4.6. The principal changes to the Procedure are contained in paragraph 8 (the requirement to take written patient details to the blood fridge), paragraph 9 (which requires that three further aspects of the patient's identity be checked), and paragraph 14 (which

makes it clear that the two checking staff members should not sign the blood transfusion report and IV fluid order chart until the checking procedure is complete).

4.7. I agree that the new Procedure is an improvement on the old one, and leaves little room for misinterpretation as to the responsibilities of the nurse administering a blood transfusion. If nurses receive an adequate degree of training, and an adequate opportunity to familiarise themselves with the procedure before commencing work, then compliance with the new procedure should not be difficult, and the risk of such a tragic event reoccurring is significantly reduced.

## 5. Conclusions

5.1. On the basis of the evidence before me, I find that Mrs Squires' death was hastened by the administration of an incompatible blood sample during treatment at the Flinders Private Hospital.

5.2. This led to haemolysis and multi-organ failure which complicated her condition, which had already been severely compromised by an acute myocardial infarction.

5.3. Steps taken since Mrs Squires' death, namely the development of a new Procedure for blood transfusions, has significantly reduced the likelihood of a recurrence of such a tragic event.

## 6. Recommendations

6.1. For the above reasons, I do not consider it necessary to make a recommendation pursuant to Section 25(2) of the Coroners Act.

*Key Words: Blood Transfusion; Nursing Care; Hospital Treatment*

*In witness whereof the said Coroner has hereunto set and subscribed his hand and Seal the 18th day of January, 2005.*

*Coroner*