STATE
CORONER
VICTORIA

16th August, 1996
Case No: 1835/94

RECORD OF INVESTIGATION INTO DEATH

I, **GRAEME JOHNSTONE**, State Coroner,

having investigated the death of JUNE SYLVIA LONG with Inquest held at State Coroner's Office, South Melbourne on the 20th March to 21st March and 16th August, 1996

find that the identity of the deceased was JUNE SYLVIA LONG and that the death occurred on the 29th June, 1994 at Alfred Hospital, Commercial Road, Prahran, Victoria, 3181, from

1(a). ASTHMA

in the following circumstances:

At about 6.15pm on 28th June Mrs. Long, aged 69, suffered an asthma attack at her home in Highett. An ambulance was called and she was transported to the Alfred Hospital via MICA ambulance. She arrived at the hospital at about 7.25pm. Her condition deteriorated

overnight and she arrested at about 9.25am on 28th June. In spite of resuscitation attempts she was pronounced dead at 10.05am. An autopsy was not conducted.

Mrs. Long's medical history

Mrs. Long's general practitioner, Dr. Debbie Yiap [from the Nepean Family Medical Centre], after noting a past history of asthma, hypertension and various ophthalmic conditions, reported that when she last saw her patient [23/6/94]:

> `she had been coughing for three weeks and had been using a nebuliser with some relief. On examination June had a mild wheeze and a few rhonchi. Her peek expiratory flow rate was 150 L/min but her technique was not good when she used it as there wasn't a good seal with the mouthpiece. I thought that she had may have had a secondary chest infection....[and started her]...on Rulide...'

She had previously been to the clinic on 31st May for increasing nocturnal asthma and was seen by Dr. Ruth Fuller. At that stage her chest was clear. Dr. Fuller noted that she had attended the clinic from 1988 suffering `from episodic mild asthma requiring bronchodilator therapy and associated mainly with respiratory infections. Her hypertension had been controlled on verapamil and indapamide, and generally enjoyed good health.' Mrs. Long had been a smoker some 40 years ago.

the events leading up to her death

An ambulance officer with the first unit to arrive at the Long's home, D.J.Creasy, in a statement made for the investigation said `the patient's previous medical history indicated that she was an asthmatic'. Later a MICA unit arrived and transported her to hospital. Mr. Garry Hoyne, an ambulance officer with the MICA unit reported:

> `Our initial assessment showed a time critical asthmatic, our treatment involved oxygen, nebulised ventolin and intravenous ventolin...Enroute to the hospital the patient received additional intravenous ventolin and solu-cortef for her asthma...Evidence of left ventricular failure developed before arriving at hospital. The failure was treated with Sub-lingual Anginine and intravenous lasix...'

and on arrival at the hospital the other MICA officer, Mr. Robert Blaikie, reported [at 7.25pm]:

> `She was conscious, orientated, had a pulse of 120 bpm, a blood pressure of 130 systolic, a resp. rate of 20 per minute. She was less retractive with her breathing, had warm, pale, dry skin and her 02 saturation was 93%.
>
> She had a brief time of ventricular bigeminy and ventricular tachycardia for 6 beats.'

Earlier, at the house and enroute to the hospital, Blaikie states:

`She was conscious, orientated, but having difficulty speaking. Heart rate 120 bpm. Sinus tachycardia with ventricular bigeminy. Blood pressure of 160 systolic. Respiratory rate of 28 with slight retraction. 02 saturation was 83%. On auscultation she had an inspiratory and expiratory wheeze and no heart failure. She was complaining of diaphragm pain.

We continued 02 therapy at 8lpm and nebulised ventolin IV and Hydrocortisone 250 mg IV. At this stage her respiratory rate had decreased to 24 per minute and she was orientated in time, place and person. By 1915 hours her 02 saturation had increased to 93%. The monitor showed sinus tachycardia. On auscultation she had bilateral crackles to the midzones, indicating heart failure. The inspiratory and expiratory wheeze had decreased.

[the heart failure was treated as indicated]'

After arrival at the Emergency Department of the Hospital [at 7.25pm] she was placed in a cubicle. Mr. Bill Long reported:

`I was present in the cubicle whilst my wife's heart was tested and we were informed that it was alright. We were further informed that chest x-rays that had been taken revealed a slight chest infection.

At approximately 11.30pm I was in the cubicle of the emergency department with my wife. At this time she was off the ventolin machine and appeared to be returning to normal...Whilst in the cubicle we were informed by hospital staff that there were no beds available and that my wife would be transferred to another hospital as soon as a bed became available. I was told by one of the hospital staff that my wife required 2 to 3 days in hospital...I left the hospital at about midnight and at that time my wife appeared to be recovering from the attack.'

Mr. Long's view of his wife's condition is confirmed in a statement of Nurse Andrew Marsden when [in the Emergency Department]:

`Dr. Beyer prescribed treatment after which Mrs. Long improved. She became less agitated, able to speak in full sentences, was relaxed and smiling in conversation with her husband.' [Nurse Marsden went off duty at 21.30 hours]

Nurse Julie Spencer who took over the shift from Marsden stated [after reporting on Mrs. Long having vomited at 2130]:

`..8. At 2230 hours Mrs. Long became short of breath with minimal exertion. There was minimal expiratory wheeze on auscultation of her chest. She was receiving oxygen via a face mask.

9. At 2400 hours Mrs. Long had been sleeping intermittently and had minimal respiratory distress.

10. At 0110 hours on 29th June, 1994, Mrs. Long complained of shortness of breath and an audible forced expiratory wheeze was noted. Medical staff were informed of the change in her condition and a ventolin nebuliser was ordered and administered.

11. At 0120 hours that there was widespread inspiratory/expiratory wheeze of auscultation. Mrs. Long was able to converse in short sentences, however she appeared distressed, medical staff were notified of her condition.

12. A short time later Mrs. Long was admitted to Hamilton Russell House...'

Earlier [at about 0045, 29th], Dr. Ashley Miller, examined Mrs. Long in the Emergency Department [after taking a history from the patient] found her to be:

> `moderately unwell. Her pulse rate was 120 and in sinus rhythm. Her systolic blood pressure was 140. She was afebrile. On examination her cardio-vascular system I found no elevation in her jugular venous pressure and no abnormal heart sounds. On examining her respiratory system I found the patient to have poor to moderate breath sounds [air entry] and wheeze throughout her chest. ...
>
> Her chest x-ray revealed hyperexpanded lung fields. Arterial blood gases were pH 7.43 pCO_2 49 pO_2 191 HCO_3 33 and oxygen saturation 100%.'

Dr. Miller assessed Mrs. Long as having infective exacerbation of obstructive airways disease. The management consisted of `ampicillin 1g IV 6 hourly, hydrocortisone 250mg IV qid, ventolin nebulisers and oxygen. Inderal was ceased. Investigations requested were peak expiratory flow rates and sputum microscopy and culture.'

Dr. Miller was not to again see Mrs. Long until 7.30am on the 29th and found her `...unable to talk and in respiratory distress.' The result of urgent blood gas readings were pH of 7.12, pCO_2 98. These tests and her condition resulted in an order for intensive care management.

Earlier Mrs. Long was admitted under the Hospital's Respiratory Unit from the Emergency Department at about 2am. Dr. Andrew Tymms, who was working in the Emergency Department, admitted her to the ward. Tymms was an intern who had commenced his employment as a doctor 5 months earlier. He was left without adequate supervision for a potentially complex case. His treatment regime followed that set earlier in the evening by the more experienced Senior Medical Registrar, Dr. Miller.

On examination, by Dr. Tymms, Mrs. Long was found to be `moderately unwell. She had an audible expiratory wheeze and was able to talk.' Apart from physical examinations, oximetry and a blood sample being taken at 4am `to monitor the potassium level' [Dr. Tymms] no other tests were ordered between those taken in the Emergency Department and at about 6.25am. Tymms decided on the level of review applicable to Mrs. Long during the morning.

Nurse Francesa Bourgias who was on night duty at the Respiratory Unit stated `The patient since arrival had not been able to speak but a few words. Patient was however exhausted due to her physical effort in breathing. She was seen by the night HMO twice. Her condition remained the same when she was first admitted to the ward, but by morning she appeared to become more fatigued.'

Bourgias was not able to get the deceased to use the peak flow meter as she was too tired and she could not but make one word simple requests such as `water'. Her condition did not change until handover at about 7am but she was more fatigued. Bourgias considered that on arrival at the ward she was moderately unwell. She spent time with her and thought she was `tired and sicker than anticipated from conversation with the emergency department'.

Bourgias, in her statement, indicated:

> `[on arrival at the Respiratory ward] I was informed that her condition had not changed since admission to Emergency Department.'

and

> `I was in contact with the HMO again by phone several times overnight, telling him she was becoming more tired.'

Dr. Tymms differs from Nurse Bourgias' evidence as to the difficulties Mrs. Long had with speech [of more than a word]. He recalled her as being able to speak in short sentences. In addition, Nurse Clarissa Cabanilla, who commenced her shift at 7am on the 29th June stated that on handover she assessed the patient:

> `I found her breathing spontaneously but using her accessory muscles. She also looked very tired, pale and she was not responding to verbal command. At the time she was sitting right up with an oxygen mask on. Her blood pressure was normal but she was tachypneic and tachycardiac. Mrs. Long's serious condition was immediately reported to the HMO who came quickly to assess the patient. He ordered blood gasses to be checked and altered the concentration of oxygen...'

The HMO [Tymms] then called the night registrar and ordered the administration of intravenous infusion of ventolin and aminophylline and `The ICU registrar and the anaesthetist were also called to be involved with the urgent management of Mrs. Long.' At this time Tymms considered that his `level of experience required [him] to speak to more senior personnel.'

Apparently Mrs. Long had been tachycardiac with a fast breathing rate all night. She was in hospital for exacerbation of asthma. The treatment administered by the HMO was to increase the concentration of oxygen. She was given oxygen at 8 litres per minute. Following the realisation of the seriousness of her condition she was to be moved to an intensive care unit [at Fairfield Hospital] and intubated. On the arrival of the ambulance to

transfer the deceased to Fairfield, during transfer from bed to trolley, she had a cardiac arrest from which she did not recover in spite of resuscitation measures.

Dr. M. Condron, Registrar for the Respiratory Unit, was not contacted until 8am. He arrived and examined the deceased at about 9.25am. Professor Walters noted on attendance after the event `Peak flow rates not monitored because patient to SOB and exhausted!'

In spite of being admitted to the Hospital's Respiratory Unit the deceased was not seen by a Registrar or Specialist from that Unit until about 10.15am. At admission or during the morning no clinician from the Respiratory Unit was contacted for advice. Professor Walters, Director of the Hospital's Respiratory Medicine Department in his statement commented `...technically she had been admitted under my Department, although we had no previous involvement in her care.'

the `Note taking' factor

Dr. Tymms noted her respiratory rate at 40 at about 2am. Had Tymms known that the rate was 24 when seen by Dr. Bayer or 16 to 20 [Dr. Miller] he agreed `the alarm bell would have been ringing.' Tymms had not read Bayer's notes and Miller's reading was not recorded for him to see. In addition Tymms did a clinical examination at 4am but did not document the results and his impression is `she remained the same'. He was under the pressure of `time frames...[and]...other patients in casualty.' From the experience of the outcome Dr. Tymms is now of the view he would `have done arterial blood gases to get a more accurate reading of carbon dioxide level.' [at 4am]

At inquest Dr. Tymms appropriately acknowledged the importance of accurate and timely note taking. Obviously he was not the only clinician who did not make a complete record of the events.

the `ICU' bed availability issue

There was no ICU bed available for Mrs. Long at the Alfred. Mrs. Long became critically ill at about 6.25am on the 29th June. She arrested on transfer to the ambulance trolley enroute to an available ICU bed at Fairfield Hospital.

However, detailed examination of the event indicates that her earlier management in the Hospital's Respiratory Unit was the issue.

expert opinion on the management

Mr. Michael Pain, Director of Thoracic Medicine, Royal Melbourne Hospital wrote in his opinion on the management:

> `Rather than having an acute asthma attack, Mrs. Long was in chronic hypercapnic respiratory failure due to chronic airways disease [asthma or COAD, the distinction at this stage is not very important]. Some patients with hypercapnic respiratory failure are at risk of further hypoventilation when given oxygen to breath. It is thought that oxygen

enrichment removes a major stimulus to breathe and as a result the carbon dioxide level rises inducing respiratory acidosis, increasing unconsciousness and death from `CO2 narcosis'...

...because oxygenisation and carbon dioxide elimination are two separate processes, it cannot be concluded that satisfactory oximetry readings mean that respiratory failure is under control. Thus, Mrs. Long showed satisfactory oxygenation in spite of progressive ventilatory failure.

The decision to treat the situation conservatively was appropriate provided the risks were appreciated and medical expertise was available. There was no requirement for admission to an ICU bed at presentation to the Emergency Department or at 0200 hrs on 29/6/94. Urgent ICU type measures only became indicated following the recognition of the development of further hypoventilation at 0820 hrs.'

and

`The conservative management of hypercapnic respiratory failure is somewhat specialised and the province of thoracic physicians. The experience of the attending medical officers in this area is not stated. The patient was admitted to the hospital under the Respiratory Medicine Department. It appears, however, that no member of the Department was involved in providing management advice until the crisis had occurred.'

In addition Mr. Pain said of Dr. Miller's readings at 0045 they `...indicate the presence of chronic [more than 24 hours] ventilatory failure. The oxygen value is high indicating that Mrs. Long is receiving oxygen enriched air at a concentration of at least 35% [and probably higher].' At this stage Mrs. Long was having difficulty in using the peak flow meter. At about 2am her saturation level was 97%.

In the opinion of Professor Walters the measurement of respiratory rate is `just extremely soft in exact sign, it doesn't really tell you very much. It is the carbon dioxide that tells you whether the alveoli are being adequately ventilated not the respiratory rate.' This confirms the importance of regular arterial blood gas tests in cases where oxygen therapy is being used to treat respiratory distress.

Professor Walters said of the system in answer to the question `The patient only got the benefit of a junior resident officer and a registrar who is not necessarily trained in respiratory medicine?':

`Yes; I mean, under the conditions which existed at the time and which were historical, it was left to the discretion of the admitting registrar who is a general medical registrar in training, a relatively junior doctor, to decide whether the case was sufficiently serious...to call in a respiratory specialist overnight or not. We have a senior registrar and a consultant on call 24 hours a day, seven days a week and one of the recommendations which is in force which has come out of this is that there should be no discretion from these junior doctors, that if there's a respiratory case which comes under a respiratory

bed card, a respiratory team must be informed and the details of the case must be explained, whether its one o'clock in the morning...[etc]...'

and

`It's a very difficult case for inexperienced junior doctors to handle...[and]...right from the start there was ambiguity about whether Mrs. Long had asthma or...what is loosely termed chronic obstructive airways disease...'

Of Mrs. Long's history [and an assessment of her peak flow rates - 12/9/92 (270l/min) and 23/6/94 (150l/min)] Mr. Pain suggests `that either the asthma was difficult to control or that there was an element of chronic obstructive airways bronchitis/or emphysema.'...[and]...`I note that both diagnostic labels (i.e.: asthma and COAD) are applied at various times during the final hospital admission'. In evidence at inquest Mr. Pain took the view that in the final analysis the distinction between asthma and COAD is not significant. He said `What this lady needed was very careful monitoring of a situation which could have deteriorated.'

Contribution

The Alfred Hospital, by not ensuring a protocol was in place to provide advice and/or review by a Respiratory Unit Registrar/Specialist on admission to that unit, to that extent contributed to the death. She was admitted under the care of the Respiratory Medicine Department and was entitled to specialist respiratory care.

The chance of a successful outcome in Mrs. Longs' case would have been greater had she been managed by a clinician with respiratory experience. Dr. Tymms was the junior HMO directly involved in her management, his level of experience with respiratory complaints was understandably limited, and any view of his treatment must be tempered accordingly. It is the system that needed addressing.

No other person contributed to the death.

Recommendations and Comments

I propose to forward the Findings, Recommendations and Comments to the Attorney General as a matter of information. I will also send the Findings to the:

- Minister for Human Services,
- Medical Director, Alfred Hospital,
- Association of Medical Directors of Hospitals,
- College of General Practitioners,
- Royal College of Physicians,
- The Victorian Council on Anaesthetic Mortality and Morbidity, and
- The Asthma Foundation.

General Comments - the importance of management by respiratory specialists

Since the death of Mrs. Long there have been significant changes to management protocols for patients being admitted to the Emergency and other Departments at the Alfred Hospital. Some of the changes are as a result of a general review and others, no doubt, with this event in mind.

Among the improvements listed [including additional medical staffing requirements from 7am to 12 midnight and additional inpatient beds] were:

> *`1. The hospital's protocol for asthma management has been reviewed and coordinated between the Emergency and Respiratory Departments. All Registrars working in the Emergency Department are familiar with the protocol's requirements...*
>
> *2. A Medical Registrar is now available in the Emergency Department each evening to assist with initial [documented] assessment of each patient being admitted and to support and supervise junior doctors...*
>
> *5. Additional placement rotations are now provided for Emergency Department Registrars in diverse areas of practice, including ICU, Anaesthetics, etc...*
>
> *6. Particular units are now more closely linked to specific wards; thereby ensuring that ward expertise is appropriate for the range of care required...*
>
> *7. The Medical Registrar on duty at night ensures that the receiving unit is advised of all new admissions. Acute, severe asthma patients are admitted to a specific Asthma Service. The service is located in the Respiratory Ward and works with the Department of Respiratory Medicine...*

As a result of the outcome in this case the importance of management's rapid review of procedures to avoid similar adverse events cannot be underestimated. No doubt the procedures adopted by the Alfred Hospital will have an effect areas other than Respiratory Medicine.

the danger of relying on oximetry measurements

As Mr. Pain remarked `the lessons from this death are twofold' in that:

> *(a) Oxygen induced hypoventilation is a danger in the conservative management of respiratory failure. It needs to be considered, sought and actively treated.*
>
> *(b) There is a tendency to place too much comfort in satisfactory oximetry measurements.*

With the increasing use of oximetry [since the late 1980s] for the purpose of measuring oxygen levels it is essential that Mr. Pain's general warning be directed to all medical

practitioners. Where using oxygen therapy the importance of regular arterial blood gas tests to monitor carbon dioxide levels cannot be underestimated.

In addition Mr. Pain delivered a timely warning at the inquest `Exhaustion in the context of respiratory failure is a bad prognosis'... [and]...`The development of exhaustion in respiratory failure usually require[s] mechanical ventilation.' Where a hospital does not have the expertise in respiratory medicine available transference to a hospital with the appropriate skill level may be necessary.

Recommendation 1

The Public Health Branch of the Department of Human Services consider providing a general warning to all hospitals/medical colleges in the terms of the specialist medical comment in this case. Specific attention should be drawn to the dangers of relying on oximetry in the management of respiratory failure.

Early expert management with regular arterial blood gas tests for carbon dioxide levels should be considered.

The importance of recording observation by clinicians

This is not the only case investigated in this jurisdiction in which noting observations may be a factor in a subsequent poor outcome [see the finding in Maxwell Living Williams - Recommendation 6].

Again it is essential that the medical colleges reinforce the need to take adequate notes of observations (and record vital signs etc.) for the benefit of future clinicians management decisions.

For this purpose I repeat the Recommendation in the matter of Williams (with appropriate deletions).

Recommendation 2

It is suggested that the problems associated with a failure to take accurate notes be emphasised through the relevant medical colleges.

No doubt with the development and increasing use of computer technology will come improvements with the medical recording of important health data. This may lead to early warning mechanisms built into what may be regarded as routine [but on many occasions important] medical vital signs monitoring procedures.

a need to exchange lessons learnt from internal audits of events

After the death of Mrs. Long it is understood an audit under the Health Services Act 1988 was conducted by the Alfred Hospital's Patient Care Review Committee. Statutory

immunity is provided to the Patient Care Review Committee established under the Act. The information is confidential under the provisions of the legislation and was not disclosed at inquest. This process is appropriately designed to identify problems in management in a blame-free environment with the aim of improving medical procedures.

Unfortunately, there is no evidence that lessons learnt by similar internal review processes are generally recorded and distributed throughout the hospital/medical system. The benefits of efficient incident reporting systems are seen in many occupational health and safety areas and more recently for monitoring/review of the effectiveness of Victoria Police's `Project Beacon'. Much of the resources targeted towards the prevention of injury on our roads are driven by investigation, data and multi disciplinary cooperation. We have seen the results in a significant reduction of the death/injury rate.

It must be noted that there is one area in which preventative investigation, information collection and dissemination in the health sector has shown results - the work of the Victorian Consultative Council on Anaesthetic Mortality and Morbidity .

It is essential that all hospitals [and clinicians] examine their procedures in the light of cases such as Mrs. Long's. As was stated during the inquest by Professor Eugene Walters, Director of Respiratory Medicine at the Alfred:

> *`...every hospital needs to look at itself when a tragedy occurs and every hospital can do better.'*

Accordingly it is essential that all serious incidents involving iatrogenic injury/death be internally examined at hospital level with a view to identifying factors and implementing countermeasures. Accurate internal investigation aimed at identification of all factors with prevention as a goal would be of potential use to the wider hospital/health system. Standardised internal investigation systems would be a precursor to establishing an accurate database on preventable iatrogenic injury for the health system. There also needs to be a system to ensure exchange of lessons learnt from incident reviews/inquests.

In this case the lessons learnt by the Alfred are not necessarily systematically disseminated to other hospitals [see discussion pps 138-139 inquest transcript - Professor Walters and 242-243 - Mr. Pain]. Whilst the Coronial Service can begin a process of disseminating the information there is still room for improvement. In the event that Mrs. Long survived the system failure evident on 28th/29th June and there still followed an internal review the dissemination of any systems improvements would be not guaranteed.

The development of a model incident investigation, data collection and dissemination process for all hospitals may be appropriate.

Recommendation 3

The Public Health Branch of the Department of Human Services consider developing a standardised investigation protocol for hospitals for all serious adverse medical events

[injury or death]. Any system, if considered appropriate, also should include a data collection and reporting mechanism to ensure any problems identified are disseminated throughout the hospital/medical system in a timely way.

Problems identified in one hospital's systems following an incident may not necessarily apply to other hospitals. However, where systems failures are concerned, there are risks they may be widespread.

Graeme Johnstone

Mr. Douglas Pulling for the family,
Mr. Jeremy Ruskin for the Alfred Hospital, and
Senior Constable Belinda Castleman, Assisting the Coroner.