Fatal Accident Inquiry

Into the death of Gladys Dalziel

Sheriff Graeme Napier

Lerwick Sheriff Court

SUMMARY

2nd February 2007

A fatal accident inquiry into the death of Mrs Gladys Dalziel at Aberdeen Royal Infirmary on 22nd December 2002 has found that as a result of developing septicaemia and pneumonia she died from multi-organ failure.

The inquiry started on 15 August 2005, heard evidence on 14 separate days and concluded with submissions from the various parties represented on 24 March 2006 The purpose of the inquiry was to ascertain the circumstances of the death, whether there were any failures in the system of working which caused this and if any reasonable precautions might have resulted in Mrs Dalziel's death being avoided.

The inquiry also allowed any other facts relevant to the circumstances of the death to be explored.

Summary of the Sheriff's findings:

Mrs Dalziel acquired a spinal infection (vertebral osteomyelitis) possibly while she was on a cruise with her husband in early September, and first presented at Lerwick Doctors Group Practice on 14th September 2002. The cause or source of that infection is unknown, but was of the staphylococcus aureus variety. The infection entered her lumbar spine from the blood flowing to the vertebrae.

It is highly unusual for an otherwise well woman of age 52 to suffer from vertebral osteomyelitis. The symptoms which she initially complained of were consistent with the much more common degenerative back pain from which she had previously suffered.

On the basis of the evidence there was nothing untoward in the way in which Mrs Dalziel was dealt with prior to her attendance at Gilbert Bain Hospital, Lerwick on the 27th October 2002 suffering from considerable back pain.

Blood samples taken by the hospital were not acted on appropriately by any doctor in her practice and therefore she was not referred to a specialist for further investigation. Had they acted upon these results, any general practitioner dealing with Mrs Dalziel should have been able to identify that there was evidence of mild pyrexia indicating a possible infection. It would then have been appropriate for Mrs Dalziel to have been referred to a specialist for further investigation.

This would not have been an emergency referral and it is unlikely that she would have been seen by a specialist until mid November 2002.

On the18th November 2002, Mrs Dalziel suffered a vertebral collapse. This occurrence led to a doctor from Lerwick Doctors Group Practice being called out on the 21st November and her admission to Gilbert Bain Hospital that day and to Aberdeen Royal Infirmary the following day.

At Aberdeen Royal Infirmary appropriate steps were taken to investigate and treat the infection and surgery was carried out. The infection was brought under control and Mrs Dalziel's general condition improved and she started to mobilise.

Mrs Dalziel continued to make a satisfactory recovery until the 16th December 2002. Her subsequent deterioration was due to her developing a second infection (gram negative bacillus enterobacter aerogenes). This infection led to septicaemia. Mrs Dalziel also developed candida pneumonia. She died on the 22nd December 2002..

On the balance of probabilities, the second infection was not linked to the first infection except in a peripheral way and her death cannot be linked to any failings on the part of the Lerwick Doctors Group Practice.

The clinicians dealing with Mrs Dalziel at the time of her death were struggling to find an answer to the cause of the second infection which overwhelmed her.

The Sheriff, in his report, stated that *"notwithstanding the very detailed examination of the circumstances during this inquiry, that question remains unanswered".*

NOTE
This summary is provided to assist in understanding the Court's decision. It does not form part of the reasons for that decision. The full report of the Court is the only authoritative document.

The full Fatal Accident Inquiry report will be available from 10.00am today at this location*:* *http://www.scotcourts.gov.uk/opinions/FAIDALZIEL.html*

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SHERIFFDOM OF GRAMPIAN, HIGHLAND and ISLANDS at LERWICK

DETERMINATION

by

SHERIFF GRAEME NAPIER
Sheriff of Grampian, Highland and Islands at Lerwick

in

Inquiry into the circumstances of the death of

MRS GLADYS DALZIEL

Under the Fatal Accidents and Sudden Deaths Inquiry (Scotland) Act 1976

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APPEARANCES:

For the Crown:	**Mr McKenzie** **Procurator Fiscal Depute**
For the Dalziel family:	**Mr Hayhow, Advocate,** **instructed by Messrs Tods Murray,** **Solicitors, Edinburgh**
For Doctors Anderson and Clarke:	**Mr Holmes, Solicitor,** **Shepherd & Wedderburn,** **Solicitors, Edinburgh**
For Doctors Krusche and Murphy:	**Mr Stewart, Solicitor,** **Dundas & Wilson, CS, Edinburgh**
For Shetland Health Board **(until 24.08.05)**	**Miss Hazel Craik, Solicitor** **Central Legal Services, Edinburgh**
For Grampian Health Board **(from 21.11.2005)**	**Mr Mackenzie, Advocate,** **instructed by Central Legal Services**

CONTENTS

1. INTRODUCTION

Application

[1] This was a discretionary inquiry held at the instance of the Lord Advocate it being said to be expedient in the public interest that an inquiry under the Fatal Accidents and Sudden Deaths Inquiry (Scotland) Act 1976 be held into the circumstances of the death of Gladys Dalziel at Aberdeen Royal Infirmary on 22nd December 2002. The application narrated that the recorded cause of death was:-

1(a) Multi organ failure
1(b) Gram Negative Septicaemia
1(c) Para Spinal Abscess
1(d) Rhabdomolysis

It was also said that the deceased, who had been a patient at Lerwick Health Centre General Practice, attended that practice on 14th September 2002 by way of an emergency appointment complaining of severe back pain; between 14th September 2002 and 27th October 2002 the deceased attended at the said general practice on a further five occasions with continuing back pains; and on these five occasions she was seen by four different doctors who variously recorded an improvement in the deceased's condition whilst at the same time increasing the dosage of painkillers prescribed to the deceased. It was further said that on 27th October the deceased attended at the Accident and Emergency Department of the Gilbert Bain Hospital, Lerwick, complaining of back pain; she was given a powerful painkiller by intramuscular injection and a blood sample was obtained from her for the purposes of a full blood count. She was discharged on the same date and the subsequent biochemistry reports of analysis of said blood sample dated 28th October 2002 revealed widespread abnormalities; said reports were immediately sent to the said general practice.

[2] Further it was narrated that between 29th October 2002 and 16th November 2002 the deceased attended a further five appointments at the said general practice during

which period the practice did not reconcile the biochemistry reports with the deceased's medical records and the biochemistry reports were not acted upon by the general practice.

[3] Further it was narrated that on 21st November 2002 the deceased was visited at home by a general practitioner from the general practice and arrangements made for her emergency admission to Gilbert Bain Hospital; and on 22nd November 2002 she was transferred form Gilbert Bain Hospital to Aberdeen Royal Infirmary where she subsequently diet.

Inquiry

[4] This was a complex and lengthy inquiry, more so than was anticipated at the business meeting preceding the commencement of the inquiry. At that time there was no indication that there might be any real dispute as to the cause of Mrs Dalziel's death. However that issue came to dominate the inquiry and my deliberations since. The evidence in relation to the cause of this lady's tragic death was complex. The inherent complexities of the medical issues in this case were exacerbated by the way in which the inquiry proceeded, of necessity due to the non availability of certain crucial witnesses and the need to abandon the original timetable. The need for representation for Grampian Health Board was not initially anticipated. That only arose during the course of the inquiry when it became apparent that the enterobacter infection and candida infection implicated in Mrs Dalziel's death were not issues for her prior to admission to Aberdeen Royal Infirmary.

[5] A number of the matters identified by the Crown in the application were not established to my satisfaction and in particular, as will be seen, I was not satisfied that the recorded cause of death was borne out by the evidence led.

[6] Given all these difficulties it is particularly appropriate that I record my thanks to the representatives of all parties to the inquiry for the professional and helpful way in which they discharged their responsibilities and for the helpful submissions (amounting in total to some 112 pages) made at the conclusion of the inquiry. Equally importantly, I consider it right to record my recognition of the role which Mr Dalziel, the husband of the late Mrs Dalziel, played in the inquiry, in particular the dignity with which he presented himself in giving evidence over two days during

which he was required to recall what must have been for him particularly painful memories; and the conscientious and courteous way in which he and other members of the family conducted themselves as they sat through many days of complex medical evidence. To the extent that I do not ultimately accept parts of Mr Dalziel's evidence that should be seen primarily as an issue of reliability. He was after all giving evidence almost 3 years after the event.

[7] The inquiry commenced on 15th August 2005 with the evidence of Mr Dalziel. It had originally been intended to proceed to a conclusion of the evidence during that week and the following week, however because of non availability through illness of Dr Anderson that original timetable was re-organised with the inevitable difficulties of securing the attendance of other professional witnesses. In the event the inquiry concluded effectively on 24th March 2006 the date fixed for oral submissions (although all parties had tendered their submissions in writing by then).

[8] During the course of the inquiry evidence was heard on 14 days from a total of 19 witnesses, 15 of whom were medical witnesses from various disciplines. In addition to those who were professionally involved in the care of the deceased a number of witnesses were called by parties to provide the benefit of their expertise to the inquiry. It was clear to me from their evidence and their curriculum vitae these included some of the leading lights in the various disciplines encompassed. These witnesses included:

<u>General Practice</u>

Dr. Daniel Rutherford called for Drs. Krusche and Dillon;
Dr. Peter Thornton called for Drs. Clarke and Anderson;
Dr. David Cochran called for the family;

<u>Surgery</u>

Mr Andrew William Kent (consultant in trauma and orthopaedic surgery) called by the Crown.
Mr David Jaffray (consultant orthopaedic spinal surgeon) called for the doctors.

<u>Anaesthesia and Intensive Care</u>

Dr. William Alexander Hamilton Hunter called for the Crown

Infectious Diseases

Dr. David Rubinstein called for the family.

Pathology

Dr. Sharon Edwards called for the Crown

[9] In addition, those doctors involved in the care of the deceased who gave evidence also included well qualified and experienced doctors and, along with the CV's for the independent 'experts' I have included in Appendix 1 a summary of their qualifications. These were Drs. Clarke, Anderson, Murphy and Krusche who at various points acted as Mrs Dalziel's GP; Professor Fiona Jane Gilbert who was involved in providing radiology opinions on the deceased; Mr Emmanuel Kingsley Labram, consultant neurosurgeon; and Dr. Peter Bryce Randalls, consultant in intensive care medicine.

2. SUMMARY OF EVENTS LEADING UP TO DEATH

[10] The following summary of what I considered to be the significant, or at least potentially significant matters leading up to Mrs Dalziel's death allows discussion of the cause of death to be placed in context. This is condensed the evidence led, and the medical records and expert reports produced to the Inquiry.

[11] Mrs Dalziel was aged 52 at the time of her death (born 18/7/50). This was significant as at such an age she had no predisposition to vertebral infection. She was known to have fibroids and had over a period of years presented at the general practice in Lerwick complaining of back pain and neck pain. She also had a history of removal of a ganglion of the wrist in 1971 and a skin problem in 1973 and 1977. This history did not suggest a patient who presents to their doctor unnecessarily or had any predisposition to infection of a type which occurred. The following paragraphs detail her history of back pain and similar symptoms taken from her general practitioner records. These are relevant as the background against which some of the experts considered the general practitioner's treatment of Mrs Dalziel should be considered.

[12] In 1981 Mrs Dalziel had a single GP consultation apparently because of numbness in the right leg with pain in the lower back. An x-ray was carried out of the lumbar spine and sacral iliac joints. This was described as normal (in appearance).

[13] In 1987 an x-ray examination of her pelvis and hips was carried out because of left hip pain. No abnormality was identified and the symptoms settled.

[14] In 1993 there were two consultations because of backache. In 1994 Mrs Dalziel was seen by a general practitioner on several occasions because of pain in the coccygeal region and right buttock. She received anti-inflammatory medication and physiotherapy; her pain appears to have resolved.

[15] In 1995 she presented with neck pain but following investigation with radiology and haematology this was diagnosed as cervical spondylosis (wear and tear of the bones in the neck). Her symptoms rapidly resolved.

[16] On 26th October 2000 Mrs Dalziel attended her General Practitioner's because of pain in the right buttock, radiating down the side of the right leg. It was recorded that she was taking anti-inflammatory pain relieving drugs occasionally and attending a chiropractor.

[17] During 2001 Mrs Dalziel attended her GP's surgery twice for non related matters and on 31st July 2002 she received a routine check of blood pressure, weight and cardio-vascular risk factors, returning on 15th August for a fasting blood sample to be taken.

[18] There had thus been no record of problems with back pain for almost two years prior to the incidents I am about to describe.

[19] It appears from Mrs Dalziel's own description (contained in the Aberdeen Royal Infirmary medical records) that whilst on a cruise during August and September 2002 Mrs Dalziel developed pain in her back. She first presented to the Lerwick Doctors Group Practice as an emergency appointment on 14th September 2002 in great pain, describing being in agony for 24 hours. She saw Dr Gillian Clarke.

[20] The only witnesses I have noted as referring in evidence to the back pain developing on the cruise are Mr Jaffray (page 11B - 24/8/05) and Mr Labram (page 8 - 15/12/05). Both took this from a senior house officer's note made following the transfer of Mrs Dalziel to Mr Labram's care on 23rd November 2002. That careful note records that Mrs Dalziel's complaint started 10 to 12 weeks previously "whilst on a cruise… [she] felt pain in her back, was feeling cold and shivery." It was said that she felt unwell during the whole cruise but could not explain why and came home with her symptoms worsening and was unable to walk by 12th September. She reported that with painkillers and non-steroidal anti-inflammatory drugs her condition had improved but deteriorated again over the preceding week.

[21] The genesis of the infection was not a focus for evidence at the Inquiry. None of the medical experts were asked about any significance in Mrs Dalziel's complaint having started perhaps a few weeks prior to her first attendance with Dr. Clarke, rather than the 24 hours history she gave Dr Clarke. In my view the longer history is consistent with the evidence. Mr Dalziel said in evidence that his wife had had no problems with her back on holiday. He suggested that his wife first felt unwell on 11th September 2002 immediately after their return from holiday when, following some gardening, she felt a slight pain in her right hip. As this pain was marked again after gardening the following day a telephone call was made to Lerwick Health Centre resulting in the emergency appointment on 14th September 2002. I am not willing to speculate on what difference it would have made to her treatment if Mrs Dalziel had disclosed to Dr Clarke the earlier incident on the cruise and that had been linked to the recent onset of back pain. It may be that given her history of back problems Mrs Dalziel did not initially consider it to be sufficiently important to mention. She clearly made some connection between the two when speaking to the physiotherapists (see paragraph 42 below) and also when admitted to Mr Labram's care. As this matter is not covered in the evidence I cannot speculate.

[22] It is surprising that Mr Dalziel was not aware of this earlier history but perhaps he forgot. It is also relevant to record here that on a number of occasions it was suggested to the inquiry on behalf of the family that Mrs Dalziel could not have been reporting an improvement in her condition because there were other indications that her condition was worsening from the 14th September. I am satisfied that the note from 23 November, which has all the hallmarks of having being based on information taken directly from the lady herself, confirms that she was reporting and presumably feeling some improvement. The evidence of Mr Dalziel and his family that there was a progressive deterioration in her condition from the start must be seen in this context as should the evidence of Dr. Cochran.

14 September 2002

[23] Mr Dalziel accompanied his wife to the health centre and into the casualty room. Dr. Gillian Clarke was the consulting doctor. She gave evidence to the inquiry and indicated that she had a clear recollection of the consultation. I am prepared to

accept that she did so. In particular I accept her evidence in preference to that of Mr Dalziel, who, I consider is mistaken in his recollection of the length and content of this consultation (which he estimated at lasting no more than four to five minutes). Dr. Clarke described this consultation clearly in her evidence. She recollected it lasting approximately 20 minutes. It was particularly memorable because of Mrs Dalziel's presentation: she was unable to do anything other than stand. Dr. Clarke recording Mrs Dalziel's difficulty in walking said she was "in agony" had "difficulty walking" and "did well to get here". The description of the complaint was that Mrs Dalziel was suffering from low back pain with no loss of sensation, with no loss of power and passing urine normally. With the limited examination Dr Clarke was able to carry out (with the patient standing) she described a tender lumbar spine at the first sacral segment of the right sacro-iliac joint (linking the spine to the pelvis). No diagnose was made but the doctor queried a possible disc problem and sacro-ileitis (inflammation of the sacro-iliac joint). The doctor's evidence, consistent with her record, was that she showed Mrs Dalziel exercises to carry out designed to assist. This was another point on which Mr Dalziel's evidence conflicted but where I accept the evidence of the doctor. The patient was prescribed pain relieving anti-inflammatory and muscle relaxant drugs with a warning of the side effects. She was advised to return the following week if the problem did not settle. As I have said there is no suggestion that Mrs Dalziel related the complaint she presented with to the pain or discomfort that she appears to of suffered on the cruise.

[24] On 24th September 2002 Mrs Dalziel still had pain and again attended the practice. She was apparently seen by a locum doctor (a Dr. Cosnett) who did not give evidence at the inquiry. His consultation was recorded in the medical records and discloses that Mrs Dalziel's back was getting slightly better although she appeared to be experiencing side effects from her medication. Further painkillers were prescribed. The record clearly notes "back getting slightly better". Mr Dalziel was at a loss to explain this entry given his general description of his wife's condition deteriorating steadily (page 14 - 16/8/05). His only explanation for this was that his wife was making light of her condition. I think, given all I heard that this is likely. He was not however present at this consultation, although he had taken his wife to the health centre. He was in no position therefore to dispute what was said

although he thought it was unlikely that his wife would have said what is recorded. I can, however, see no reason to doubt that this is an accurate record of that consultation. It is entirely consistent with the other evidence pointing to Mrs Dalziel describing some (all be it fluctuating) improvement in her condition.

7th October 2002

[25] On 7th October 2002 it appears that Mrs Dalziel's backache was worse and an appointment was arranged whereby Mrs Dalziel saw Dr. Dylan Murphy. Mr Dalziel did not think he had been present with his wife in the consultation room. Dr Murphy gave evidence. He considered that Mrs Dalziel was suffering from low back pain. His record used the phrase "sciatica at approximately L2" to describe this, but his evidence was that he used this is a non specific or non technical way. As he put it "sciatica is sometimes used to mean different things by for instance a GP or for instance a spinal surgeon" (page 150 – 17/8/05). This use of language was criticised by Dr. Cochran, however other witnesses at the inquiry clearly understood that GPs regularly used this phrase and also the phrase sacro-ileitis in a non technical way. It was accepted that reference to 'sciatica' associated with the second lumbar vertebra was inappropriate and I did not consider that this very technical criticism of Dr. Murphy's note taking was justified. Dr Cochran also criticised Dr Murphy for not fully recording his clinical examination. I did not consider that criticism justified. Dr. Murphy was clear that there had been a full examination and that he had found no signs or symptoms of serious underlying disease and had marked "no red flags" (for an explanation see the section on the Royal College Guidelines in Appendix II). Dr. Murphy referred Mrs Dalziel for physiotherapy and altered her analgesia.

11th October 2002

[26] Mrs Dalziel was seen by Dr. Yvonne Anderson on 11th October 2002. Mr Dalziel said in evidence that he had been present at this consultation but also said that his wife had already been seen by the physiotherapist. That position is however, inconsistent with the physiotherapy records which do not commence until 17th

October 2002 and also with Dr. Anderson's later note to chase the physiotherapist. Dr. Anderson's note in the medical records was consistent with her evidence and was that Mrs Dalziel reported feeling a slight improvement using codydramol but was still suffering from pain. There was some discussion between them about whether drugs previously prescribed had been causing Mrs Dalziel stomach upsets. Mr Dalziel accepted that this description of "slight improvement" could have been said to the doctor but did not remember. However he also said that had his wife indicated that she was feeling a slight improvement he would have intervened as that was not his view of the progression. There is no evidence, however, that he did intervene in this meeting. The result of this consultation was that Dr Anderson agreed to chase up a physiotherapy appointment and to follow up with the patient if her symptoms deteriorated. The physiotherapy records show that the following day Mrs Dalziel's referral was re-prioritised by the physiotherapist after Dr Anderson's intervention.

21st October 2002

[27] Mrs Dalziel again attended at the Lerwick Practice on 21st October 2002. She again saw Dr Murphy. Consistent with the physiotherapy records, Dr. Murphy noted that Mrs Dalziel had attended the physiotherapist on 14th October 2002 and that her symptoms were "getting better with physio". This record, and the doctor's evidence was contradicted in evidence by Mr Dalziel who suggested (page 23 - 16/8/02) that attending at the physiotherapist frightened Mrs Dalziel. Again, however, from his evidence, it would appear that Mr Dalziel was not present at the consultation and was not in a position to contradict Dr Murphy's clear evidence.

[28] All of the consultations up until this point lead to the conclusion that although Mrs Dalziel had attended her GP practice frequently in relation to this back complaint (contrasting with a medical history which did not show her to be a frequent attendee at the practice) she was nonetheless reporting some improvement. Although this supposed improvement was dismissed on behalf of the family, not only the doctor's evidence but also the records support this to be what she was reporting.

Physiotherapy Records

[29] The inquiry did not hear from any of the physiotherapists involved in the treatment of Mrs Dalziel. It is clear from these records that Mrs Dalziel attended physiotherapy on 14th, 17th, 23rd and 25th October 2002. In his evidence Mr Dalziel (page 9 - 15/8/02) suggested that his wife had attended one physiotherapy appointment only. Again I consider that his evidence on this point is mistaken. The physiotherapy records formed pages 106 to 109 of production 3 for the Crown and were spoken to by a number of witnesses. They are of interest for a number of reasons:

1. The "physiotherapy request for assessment and treatment" form was completed by Dr. Murphy and is signed by him and dated 8th October 2002 consistent with it having been completed the day following his consultation with Mrs Dalziel referred to above. As noted above, the form also records that the referral had its priority changed from semi-urgent (as suggested by Dr. Murphy's request) to urgent by Dr. Anderson on 14th October 2002. This is entirely consistent with the evidence of these two doctors.

2. It is also of interest to note, given the criticism of Dr. Murphy's recording a diagnosis of 'sciatica' in the GP records, that the clinical summary of the reason for referral was that the patient had been suffering from lower back pain for one month, with that pain "radiating to the L2 area now". The pain was described as significant and he raised a question mark as to a possible disc prolapse.

3. It is also clear that in addition to the GP examinations carried out including the, of needs, limited one by Dr Clarke and the fuller one by Dr Murphy that a full (McKenzie Institute) lumbar spine assessment was carried out by the physiotherapist who saw Mrs Dalziel on 14th October for her first appointment. As I understand them there is nothing in the records of the physiotherapist's assessment or treatment to suggest that features of serious underlying spinal pathology were present on any of the occasions Mrs Dalziel attended. Interestingly each of the entries records a reduction in pain associated with exercise and the final entry of attendance on 25th October 2002 records that Mrs Dalziel's symptoms were "much easier".

[30] I pause to note that in the record of that examination the physiotherapist has noted the onset of Mrs Dalziel's problems as having occurred during her cruise when she awoke with lower back pain and after one week she reported to her GP (not the 24 hours beforehand recorded in Dr Clarke's examination). As I have indicated before this extended history was not raised with any expert witnesses and it would therefore be inappropriate for me to speculate on its significance. Even if not relevant to the development of Mrs Dalziel's illness this may, be of significance in relation to the question of communication of information between professionals. Again, however, it would be inappropriate for me to make any determination on this point given that the issue was not covered in evidence. It is worth recording that Mr Jaffray, an experienced and well qualified consultant orthopaedic spinal surgeon, placed much reliance on the skill of physiotherapists in identifying significant back problems. There was nothing in what the physiotherapist records to suggest such.

[31] Again this is entirely consistent with what was recorded by Dr. Murphy on 21st October 2002.

[32] The final physiotherapy entry for 25th October 2002 notes that Mrs Dalziel was to be seen again on 4th November 2002. However, the entry for that date reads "UTA [which I presume means unable to attend] as she was unwell and that she would contact the department for another appointment". Because of the developments that I am about to describe, that appointment did not happen.

[33] Even if these physiotherapy records had been communicated to the general practitioners, as by Mr Mackenzie suggested in his submissions should have happened, I am left with the questions what, if any, difference that would have made (given that these records simply confirm a generally improving situation as reported by Mrs. Dalziel herself) and how that would have avoided the death. The only point in the physiotherapy records that was not consistent with what was recorded by the GP's was the date on which Mrs Dalziel's problems were suggested to have started.

I have already dealt with the possibly that these started on the cruise some days prior to her first having reported them starting when seeing the GP.

[34] Given these physiotherapy records with reference to Mrs Dalziel's exercise regime it is interesting to note that Mr Dalziel (at page 38 - 16/8/02) says that he can remember "no exercising being done at home". Further he says that Mrs Dalziel had received no benefit from physiotherapy although the records suggest otherwise. Mr Dalziel did eventually concede that it was possible that his wife could have been doing some exercises but only "if she was sitting in a chair".

[35] Although I will say more of this later, in my analysis, for present purposes I should say that in general terms I do not consider that up to this point there is any justifiable criticism of the general practitioners' treatment of Mrs Dalziel.

27th October 2002

[36] The events following this date will be dealt with in greater detail later but for present purposes it will suffice to record that Mrs Dalziel attended at the accident and emergency department of Gilbert Bain Hospital on Sunday morning, 27th October 2002 at 00.25 hours. The evidence from Mr Dalziel (who was the only person to give evidence about this attendance) was that on the Saturday (26th October 2002) his wife had been "desperately uncomfortable" and was helped to bed about 19.00 hours. A nurse friend advised that the quickest way to have his wife seen by a doctor at the weekend was to take her to accident and emergency department at the hospital. This they did, arriving, according to his evidence about 23.00. This is consistent with the doctor (who I understand was a Dr McLeod, a senior house officer from New Zealand working there temporarily) seeing Mrs Dalziel shortly after midnight, as suggested in the medical records. Mr Dalziel accepted that the doctor carried out a thorough examination (as described in the record) took a blood sample and gave her an injection of a painkiller (tramadol). Interestingly, from the perspective of the criticisms which were subsequently made about the lack of x-ray examinations by the GP's, no x-ray examination was arranged by this doctor although he carried out an apparently comprehensive examination. His note, in the Accident and Emergency record sheet, records the only abnormalities as a slight elevation of temperature

(recorded at 37.6° centigrade) and a rapidity of pulse rate (112 settling to 97 per minute). The doctor also recorded that Mrs Dalziel, although mildly febrile, was suffering from no obvious fever and there was no tenderness over the spine or muscles and no restriction of spinal movement. The record summarises Mrs Dalziel's presentation as "undiagnosed lower back/buttock ache and febrile". Pain relief medication was prescribed with advice to see a general practitioner the following day (which would have been a Monday). There is also a note "bloods pending" denoting that a specimen of blood had been taken and sent for analysis. Despite these clear records of an apparently thorough examination there is nothing to support Mr Dalziel's description of Mrs Dalziel as being "grey coloured and not looking well" (pages 42 and 43 – 16/8/05).

[37] One of the significant aspects of this attendance is that, as least as far as can be her records show and according to Mr Dalziel, Mrs Dalziel had never attended at an accident and emergency department previously.

[38] During the course of the inquiry there was some discussion about the purpose for which the blood sample was taken. There was no direct evidence from the doctor, of course, and there was no evidence that it was a necessary step or what in Mrs Dalziel's presentation would have suggested that it was appropriate for such a sample to be taken. Suggestions to explain that included that the doctor may have had a gut feeling that it might be helpful; or alternatively that it was a useful way in which to bring the consultation to an end (that is it served no specific purpose).

[39] Be that as it may, the doctor arranged for a biochemical analysis of the blood sample and a copy of his record of his examination and the later results of the blood tests were sent to Lerwick Health Centre. In a separate chapter I will deal with the issue of how these results came to be misfiled (to the extent that they were filed without any action being taken on them) in Mrs Dalziel's GP notes; and how the accident and emergency sheet also came to be filed without apparently having been seen by and actioned by a doctor.

[40] All witnesses agree that there were significant abnormalities in the results of the blood tests. The haemoglobin level was low (9.9 g/dl); the white cell count high

(11.8 x 10^9/l) with an excess of neutrophils (9.5 x 10^9/l). The platelet count was also high (596 x 10^9/l) and the ESR [the erythrocyte sedimentation rate] was raised (66mm/hr). The biochemistry report showed a low albumin level (30g/l) and raised C-reactive protein level (>18.0).

[41] These results are to be found at page 97(a) & (b) of Production 1 for the Crown. No witness could say when the results were received by the Lerwick Doctors Practice (in that there was no record of when they were received there). It was accepted at the inquiry by Dr. Clarke that she was the first doctor in the practice to see them (on the basis that she was the first person who had written on them). There is no date stamp to indicate when they were received at the practice and the date printed on the result form "date received 28th October 2002" was said by Dr. Clarke not to indicate the date it was received in the practice but the date the sample was received at the laboratory which carried out the test. She suggested that these results would have been produced on a printer in Lerwick Health Centre, probably sometime on 28th October 2002 even though there was evidence that was a public holiday. The results were passed to her as she was indicated on them as being the consultant/GP who had requested the sample. It was ever explained why that was so as she was neither the person who had requested the blood sample nor the registered GP. It was accepted that the results would have been placed in her correspondence tray. When she saw them she requested the patient's notes and having seen the results together with the notes decided to refer the results and notes to Dr. Dylan Murphy, being the doctor who had last seen the patient in the surgery. This she did by placing both in his tray. She indicated that the results would have been attached to the front of the folder containing the notes using a paperclip. She had added a handwritten note to the results "Not my patient. Didn't take blood to Dylan". There was other evidence at the inquiry that Monday 28th October 2002 was a public holiday and Mr and Mrs Dalziel had, therefore, been unable to get an appointment to attend at the surgery as suggested by the hospital doctor. Dr. Clarke also recollected receiving a telephone call from Dr. MacLeod (the senior house officer who had dealt with Mrs Dalziel at Gilbert Bain Hospital). This telephone call was received by her, she thinks, on 29th or 30th, but most likely the 30th October 2002 (Wednesday). Dr McLeod was phoning to check that the blood results had been received by the practice. I conclude

that he had also seen a copy of the results as Dr Clarke recollected speaking to him about what he considered the results indicated. Apparently his view was that the blood results indicated a rheumatology problem and that the lady would probably need referral to a specialist consultant. This would appear to be consistent with what he first suspected as under the heading clinical details on the results form appear the words "query as to a possible connective tissue disorder", which words I heard would have been added by him.

[42] Dr. Clarke did not speak to Dr. Murphy about the results or the telephone call from Dr. McLeod. Nor did she make any record of the telephone call in the patient's records. Dr. Clarke had, she said, left the laboratory report for Dr. Murphy's attention by following what she considered to be the normal practice at the surgery of leaving them in a tray for him with the patient's records.

[43] Investigations carried out by the practice immediately before Mrs Dalziel's death; and other investigations carried out there after her death concluded that Dr. Murphy never saw these results. I accept, as a matter of fact, that the results were filed in the patients records without them being seen by any other doctor and without any action being taken by a doctor (or by anyone else in the practice) to follow up on these abnormal results either by bringing the patient in to the surgery to repeat the tests or by referring her to a specialist (as I heard would have been appropriate). Further the results were not communicated to the patient (or indeed to Mr Dalziel). It is also clear that the copy accident and emergency record which was also received at the practice on an unknown date was also similarly filed without any action. Had that not been so filed a doctor seeing it might have been alerted to the expected receipt of results from the blood tests.

[44] There was a general acceptance that this should not have happened. Why it happened and whether its occurrence indicated either defect in a system of work (which contributed to the death) or highlighted reasonable precautions (which could have been taken which might have avoided the death) were the foci of much evidence in particular that from the independent general practitioners, Doctors Cochran, Rutherford and Thornton. I will deal with the practice's

systems in the context of my discussion of the evidence of these witnesses. For present purposes it is enough to record the factual position is that these results were not acted on. Whether the results or the accident and emergency records had arrived in the practice by the time Mrs Dalziel was next seen there is not and cannot now be known for certain, although on the balance of probabilities I accept that they were. Had practice been more disciplined in record keeping and dating of actions then it would have been easier to reach a conclusion on this issue. At the very least this uncertainty discloses an issue with the practice's administrative procedures at that time.

29th October 2002

[45] The appropriate response to those abnormal results was to instigate arrangements whereby the patient would be called in, a further history taken, the tests possibly repeated and consideration given to a referral to a specialist consultant. Mr and Mrs Dalziel attended at Lerwick Health Centre on 29th October and Mrs Dalziel was seen by Dr. Anderson. It is clear that although by this time I accept that the results of the blood tests had been received they had not been dealt with by any doctor, other than probably being 'passed on' by Dr Clarke. They certainly were not actioned by Dr Anderson whose evidence was that although she had the medical records she was unaware of the results being there (indeed Mr Dalziel's evidence was that she looked through the records for the results). It is, of course, not conclusive that they had been seen by Dr. Clarke, although as indicated she thinks she may have seen them on 28th October 2002, which I think is probable.

[46] Dr. Anderson and Mr Dalziel both gave evidence about the 29th October consultation. There is a very full record of it in the medical records (Crown production 1 at pages 86 and 83). Dr Anderson noted that Mrs Dalziel continued to be in pain and her examination showed tenderness over the lower back and right sacro-iliac joint with some reduction in the range of spinal movement, but no limitation of straight leg raising (a test for nerve root compression) and unimpaired tendon reflexes. Dr Anderson did, however, note that blood tests had been carried out the hospital when Mrs Dalziel had attended there. There is, however, no mention of the results. Dr Anderson's evidence was that she had understood that the hospital

attendance had been on the evening preceding her consultation with Mrs Dalziel (that is on 28th October 2002) although there is no note to this effect in the record. As she thought the hospital attendance had been the previous day she was not surprised that no results of the tests had arrived at the surgery (although ironically, as I have said, it is likely that they had arrived by this stage). Dr Anderson's working diagnosis remained musculo-skeletal back pain and a plan was made for further treatment with pain relief and physiotherapy with an orthopaedic referral to follow if there were further deterioration following physiotherapy. Dr. Anderson advised a review if there were <u>any</u> (her emphasis) deterioration. However no specific arrangement was made for follow up either for a review of the patient's general condition or to discuss results of blood tests. On 30th October 2002 a referral was also made to the pain clinic for possible acupuncture.

[47] In evidence Dr. Anderson's position was that she advised Mr and Mrs Dalziel to contact the practice to obtain the results which she expected would be available within the next few days. There was nothing recorded in the lengthy note of the consultation to indicate that that is how matters were left between doctor and patient. However Dr. Anderson's position was that inviting the patient to call back for results was the standard procedure adopted by the practice.

[48] Mr Dalziel's position in evidence was that he and his wife did not subsequently 'chase up' the blood results because they had been told by Dr. Anderson that she would contact them. Whilst I am satisfied that Mr Dalziel believes that this was what was said, I am satisfied that it was not. The normal practice at the surgery at that time was to ask 'sensible' patients to phone in for the results. When Dr. Anderson said in evidence that this was what she had done in Mrs Dalziel's case she was entirely believable. Further credence is given to this position as this is consistent with no specific note having been made in the records of any alteration to the normal practice. Had the agreement been contrary to normal procedure then I might have expected such to have been recorded and some separate arrangement made.

[49] I will discuss this matter further but the position of all doctors at the surgery was that they relied upon the system they understood to be in place to ensure that results of blood tests were not filed away in medical records without being actioned by a

doctor and, if such results were abnormal, a doctor taking appropriate action. Dr. Clarke instanced a situation of abnormal blood results indicating high levels of warfarin which would require immediate action as opposed to abnormal results such as Mrs Dalziel's which would require action but not such urgent action. The only explanation for no action being taken by the surgery on these blood results (other than Dr. Clarke seeing them, noting them and marking them for Dr. Murphy's attention) was that the case notes were probably removed from Dr. Murphy's tray for the pain clinic referral letter to be typed and not replaced thereafter. That explanation presumes that the blood test results were only attached to the notes after Dr Anderson had seen Mrs Dalziel. The alternative scenario, namely that the test results were in the papers but overlooked by Dr Anderson is scarcely credible given the thoroughness with which Dr Anderson conducted the consultation, including writing a lengthy and detailed note. Despite an investigation by Mr Carle, the practice manager, no further information on the misfiling of these results or the accident and emergency attendance sheet has ever been produced.

[50] It is quite clear from the evidence that the consultation on 29th October was a difficult one. Mr Dalziel described the consultation as "a very brief meeting" (page 19-15/8/05) or "an extremely brief meeting" (page 22-15/8/05). Dr Anderson's evidence is of a lengthy meeting. The lengthy record of the consultation (pages 83 & 86 of Production 1) notes that there was a discussion about the appropriateness of x-rays being carried out and Dr. Anderson referred to this in her evidence. Mr Dalziel's position is that he and his wife were asking for an x-ray examination to be carried out (this had happened when she previously had complained of back/neck pain). There is also evidence of a discussion about a pain clinic. A follow up letter written on 30th October 2002 to the pain clinic also refers to discussion about acupuncture. These discussions do not seem to me to be consistent with the rather superficial consultation described by Mr Dalziel. When cross-examined by Mr Holmes (for Dr. Anderson) Mr Dalziel conceded (page 73-15/8/05) that there had been discussion about x-rays, about a referral to the pain clinic, about the use of the hydro-therapy pool and about painkillers. He also conceded that his recollection was perhaps incorrect. On the balance of probabilities I prefer Dr. Anderson's evidence. Perhaps Mr Dalziel's position is best summed up in his comment (at page 86A-15/8/05) in relation to acupuncture: "I honestly don't have a recall of when that was actually

discussed". Despite the detailed record of a clinical examination, Mr Dalziel did not remember any examination of his wife including leg raising saying "the only time I ever saw an examination of her was at the Gilbert Bain Hospital in accident and emergency" (page 57 15/8/05). He did not accept that he could have forgotten, however I think that is what has happened.

[51] Either Dr Anderson is correct about the consultation or Mr Dalziel is. For the reasons I have given I prefer Dr Anderson's evidence. She gave her evidence in a straight forward manner and was consistent with the records. In relation to the arrangements about communicating the blood test results it seems to me that there are two possibilities, the first is that Mr Dalziel has forgotten what was said about the blood results or perhaps Dr. Anderson's intention was not communicated in a way that he and his wife understood. At one point Mr Dalziel indicated that Dr. Anderson said that she would contact them if anything "untoward" was found in the blood tests. This of course would not be inconsistent with her also having asked them to contact the surgery for the results. It was of course policy for the Practice to take action on receipt of abnormal results irrespective of whether the patient had contacted them. The failure by the surgery to have acted upon Mrs Dalziel's results cannot be absolved by the request that Mr and Mrs Dalziel contact them for the results, although had they done so it is possible that the results would have been found before they were eventually 're-found' by the surgery on 21st November 2002.

[52] It is also quite clear from Dr. Anderson's evidence that she found the consultation taxing. There was clearly frustration on the part of Mr and Mrs Dalziel. The doctor spoke eloquently about the negative impact the consultation had on her. It was for that reason that she took time afterwards to write out a much more detailed note of the consultation than she would normally have done. I find it unlikely in those circumstances she would not have recorded all relevant information. She particularly recollected the discussion about the request for an x-ray examination and her explanation of the reason for it not being considered appropriate at that point, namely that she did not anticipate any benefit and the standard recommendation was to reduce unnecessary exposure to x-rays. By letter dated the following day (30th October 2002) Dr. Anderson did refer Mrs Dalziel to the pain

clinic at Gilbert Bain Hospital, Lerwick. If she did that I do not see why she would not have done anything else she specifically agreed. As it was the Dalziel's did not contact the practice to chase up the blood results and the practice did not contact Mrs Dalziel about them.

7th November 2002

[53] Mrs Dalziel was next seen by a general practitioner on 7th November 2002. It is worth noting, however, that by 7th November the physiotherapy record notes that Mrs Dalziel had cancelled her 4th November appointment there because she felt unwell. There is no evidence that that was communicated to the practice. The 7th November attendance involved a request by Mrs Dalziel for excusal from jury duty. Dr. Martin Krusche, who saw her, certified that she was unfit for jury service. The record notes that acupuncture was to be started on her next appointment. When giving evidence Dr Krusche had no clear recollection of this consultation. A copy of his jury excusal letter was in the medical records and reads as follows: "This is to confirm that my patient is unfit for Jury Service's (SIC), she has been suffering from bad pain the past two months and is unlikely to be fit soon". There were two points of criticism of Dr Krusche's performance at this consultation. Firstly that he did not either notice that there were abnormal blood results on the file (if they were there); or if they were not, pick up from the last entry by Dr Anderson that they were awaited. Secondly it was suggested that the back pain from which Mrs Dalziel was suffering, having now lasted for some 2 months (as he had noted) he did not take any further action to consider referring Mrs Dalziel to a specialist. As he put it (at page E105-18/8/05) "well they either get better in 4-6 weeks or they are not and if they are not then they have to eventually be referred to a specialist. However, at this point in time all I did was do this form and arrange a further appointment for acupuncture which she asked me… it was arranged by my colleague in the pain clinic but she also asked me I think and can I, basically she was referred to the pain clinic, can I do it faster?, and I said yes I can, come back next week".

15th November 2002

[54] 15th November 2002 was the first consultation with Dr. Krusche, for acupuncture treatment, a service he provides to appropriate patients of his own and of colleagues. Acupuncture treatment was carried out. Mr Dalziel was present but had little recollection of what happened and said he did not watch the acupuncture needles being inserted. Mr Dalziel asked for that an x-ray examination be organised but Dr. Krusche indicated that that was not appropriate as there had been no trauma. Again the blood results were not discussed, noticed on the file and action taken if they were or chased up if they were not. The doctor's evidence in chief was that in view the length of illness, he was actively considering referral of Mrs Dalziel to a visiting orthopaedic surgeon. However as she was to come back for further treatment a week later, he felt that the decision could wait until then, when he would have more time to talk to her. Were he to have made an orthopaedic referral he would have expected the surgeon to arrange for x-ray examination. Dr Krusche described his patient as having been in pain but not looking unwell. The records disclose that he prescribed further pain relief for Mrs Dalziel.

18th November 2002

[55] It appears that when Mrs Dalziel was showering on Monday 18th November 2002 she was aware of a sudden pain down her right leg with a tingling sensation (as recorded in an entry in the medical records for 21st November 2002). This was a dramatic change in her condition with a subsequent inability to weight bear and the consensus of opinion is that this change was caused by a vertebral collapse.

[56] When giving evidence (see page 81-15/8/05) Mr Dalziel had no recollection of this incident. I am, quite satisfied from the preponderance of the evidence that this is what happened and Mr Dalziel is simply mistaken in his recollection. The letter of admission, which accompanied Mrs Dalziel to hospital (see below - 21st/22nd November 2002 below) clearly indicated that on "Monday while in the shower [she was] aware of severe pain radiating down her right leg and possible tingling down the front of her leg to the ankle".

[57] It appears that in the discrete way in which she had borne her previous pain and discomfort, no immediate medical assistance was sought by Mrs Dalziel.

21st November 2002

[58] Dr. Murphy's recollection is that his first involvement with Mrs Dalziel's case on 21st November 2002 was by way of a telephone call from Mr Dalziel to Dr. Murphy expressing concern about his wife's condition. Dr Murphy's note of this call (page 84 of production 1 for the Crown) makes reference to the incident in the shower, 3 days earlier. It may be that Mrs Dalziel did not disclose fully to her husband what had happened. That seems as likely as Mr Dalziel having forgotten to mention it to the doctor or having forgotten about it between it occurring and his giving evidence to the inquiry. If the incident had been mentioned to him I think it is likely that he would have passed that information on to Dr Murphy who would have noted it as it would have been significant. At the inquiry Dr. Murphy (page 163 E 17/8/05) said that his recollection of that call was having "mentioned the medication and I gave some advice". He had no clear recollection of the call but did note in the records, for the benefit of the doctor he understood Mrs Dalziel was due to see the following Monday (25th November), his view that the complaint sounded like a disc problem and that an orthopaedic referral might be appropriate. He remembered giving some advice to Mr Dalziel regarding what he thought was a more logical combination of drugs, namely co-dydramol with diclofenac.

[59] Mr Dalziel made a second, later, call which Dr. Murphy thinks occurred sometime in the middle of the day (between morning and afternoon surgeries) and which he took when he was passing through the reception area in the health centre. Mr Dalziel in his evidence placed this call as occurring sometime late afternoon, approximately 16:15 hours, rather than around lunchtime. This is my view would fit better with when we know Dr Anderson attended. Mr Dalziel described his wife by this time as looking pale and exhausted, but not complaining (page 80 – 15/08/05). Whilst Dr Murphy had no clear recollection of the first telephone call he did recollect the second, which (page 166 -17/8/05) stuck in his mind because it was far more remarkable. Mr Dalziel was sounded distraught and he was described symptoms were clearly significant. Dr. Murphy recollected that Mr Dalziel described an episode occurring a few days earlier when Mrs Dalziel had suddenly lost power in her legs and her pain had increased. Although Dr. Murphy made no reference to Mr Dalziel

mentioning an incident in the shower, this loss of leg power incident fits in to that timescale. Mr Dalziel's description rang alarm bells for Dr Murphy and it was clearly of the view that the patient was in need of an examination and, he concluded, would need admission to hospital. Dr Murphy described it as a rare, to draw such a conclusion from a telephone call. Dr. Murphy's recollection was that Mr Dalziel said that he could not carry on much longer (or he could not take much more as his wife could not walk). It was apparent that Mr Dalziel was at the end of his tether as I can well imagine with a couple who had been married for 30 years and known each other for 36 where Mrs Dalziel had repeatedly attended with doctors and rather than seeing an improvement in her condition there was now dramatic evidence of a significant deterioration. In view of the significance of the symptoms arrangements were made to pass the case notes to Dr. Anderson to call in to see Mrs Dalziel and carry out an examination. Although there was some questioning of Dr. Murphy about his decision to deal with the matter this way rather than call an ambulance, I did not understand from submissions of parties there to be any real criticism of the actions taken by Dr. Murphy or Dr. Anderson later that day.

[60] Dr. Anderson attended at Mrs Dalziel's home. Mr Dalziel suggested that this was just after 18:00 hours. According to her own note Dr Anderson had this as being at 18.20 hours. Dr. Anderson's record is that once again that Mrs Dalziel had indicated that her condition had been improving with physiotherapy and acupuncture. She had been mobilising with a stick but on the Monday the incident occurred within the shower. Since then she described a gradual deterioration in her condition and she was now unable to mobilise. The record notes that she required to be lifted by her husband and was unable to weight-bear. On examination she was found to be unable to straighten her right leg. Dr Anderson's assessment was that this was likely to be attributable to sciatica proper and the plan was that she should be admitted to Gilbert Bain Hospital, which was done. Again I do not understand there to be any criticism of the doctor's actions in arranging for Mrs Dalziel to be admitted.

[61] Later that night, following Mrs Dalziel's admission, Dr. Anderson received a telephone call from the senior house officer (Dr McLeod) who had been responsible for Mrs Dalziel's care in the accident and emergency department on 26th/27th October and who appeared to be aware that she had been admitted to hospital by Dr

Anderson. He sought information about the results of the previous blood samples taken by him. It was only then that Dr. Anderson says that she discovered the existence of these blood test results and the accident and emergency sheet, both of which she indicated were filed in the medical records. For a reason which she was unable to explain at the inquiry, Dr. Anderson marked on the accident and emergency sheet that it should be filed. Her only explanation for this was that she did this to indicate that she had seen it. She accepted at the inquiry, that was something she should not have done and I do not consider that this is otherwise relevant to this ladies death or that there was any nefarious motivation in her doing so.

21st/22nd November (Gilbert Bain Hospital, Lerwick)

[62] No witness from Gilbert Bain Hospital responsible for the care of Mrs Dalziel on this admission was led in evidence at the inquiry. I did not understand there to be any criticism of Gilbert Bain Hospital nor any dispute about what happened. In summary (taken from other doctors' interpretations of the records) having been admitted investigations carried out the following day showed an increase in levels of inflammatory markers in the blood. An x-ray examination of the lumbar spine revealed what appeared to be a collapse of the fourth lumbar vertebra. There is reference in the physiotherapy service records (page 109 of production 3) to a discussion (that day) between a physiotherapist and Dr. Graham, one of the physicians at Gilbert Bain Hospital during which Dr. Graham indicated that he considered that the wedge fracture in the lower spine shown on the x-ray probably had a metastatic cause. There was apparently some discussion about the previous physiotherapy input to the patient and again what appears to have been said was that there had been a good response at physiotherapy. That such a discussion took place seems to me to support the view expressed by Mr Jaffray that (spinal) surgeons place considerable weight on the views of physiotherapists. Interestingly this was a view which Dr. Cochran, the GP expert, for the family, seemed to have difficulty in agreeing with.

[63] In view of findings, arrangements were then made for Mrs Dalziel to be transferred to Aberdeen Royal Infirmary, which transfer was carried out on 22nd November 2002

by air ambulance. The entry in the physiotherapy records is the only evidence I had as to what was in the minds of the doctors who arranged Mrs Dalziel's transfer as none were called to give evidence. However, the suggestion of a metastatic cause is consistent with the evidence led at the inquiry from, for example, Professor Gilbert who indicated that that was the working diagnosis with which Mrs Dalziel presented at Aberdeen Royal Infirmary. It seems to me to be significant that even with the benefit of x-ray and blood test results, the Shetland hospital doctors did not suspect the spinal infection which we know that Mrs Dalziel was suffering from.

21 November to 22 December 2002 (Aberdeen Royal Infirmary)

[64] There are three separate stages in Mrs Dalziel's attendance at Aberdeen Royal Infirmary as she was admitted first to the orthopaedic department; she was then transferred to neurosurgery; and finally she was transferred to the intensive care unit, where she remained until her death. Despite a detailed examination of the procedures followed at Aberdeen Royal Infirmary during the inquiry (which led to Grampian Health Board being represented from 21 November 2005) I do not understand that there was ultimately any real criticism of the care given. Dr. Rubenstein (whose expertise is in infectious diseases) suggested that he might have prescribed a slightly different combination of drugs at one stage in her treatment but that was not, in the result, significant in this lady's death. Mr Jaffray indicated that he might not have operated whereas Mr Labram did; but I do not understand that to be a criticism of the choice made rather an acknowledgement that Mr Labram's decision was one of a range of reasonable options whilst he (Mr Jaffray) might have chosen a different, more conservative option. Dr Hunter thought that Mrs Dalziel might have been started on antibiotics earlier than she was and that she may have had a CT scan carried out earlier than in fact it happened, but again these were not steps which should have been taken and would have avoided the death.

[65] Mrs Dalziel was initially admitted to the orthopaedic ward at Aberdeen Royal Infirmary on 22nd November 2002. I understand this was a Friday. Her condition was not such that further immediate medical intervention was indicated and no further immediate investigation by radiography was considered necessary. Other than evidence of raised inflammatory markers and having suffered a wedge shaped

fracture, I am assured by the experts at the enquiry that Mrs Dalziel was "systemically" well at that time. The inquiry did not hear evidence from any doctor from the orthopaedic department responsible for Mrs Dalziel's care in Aberdeen. However, the evidence of Professor Gilbert, who first became involved on 23rd November 2002, adequately covers the relevant points. Professor Gilbert had not had the benefit of seeing the plain x-rays which was taken at Gilbert Bain Hospital, Shetland. She did however explain to the enquiry that the Shetland hospital does not have a CT scanner or an MRI scanner, both of which were ultimately utilised in this case (their different functions are described in appendix II). She indicated that the only other technique available at Gilbert Bain hospital was ultrasound, but that was not an appropriate technique in this case.

[66] On 23rd November 2002 what is described as an emergency CT scan was carried out on Mrs Dalziel's lumbar spine. Professor Gilbert was personally responsible for the CT scan and later, while the patient was on the table she proceeded to carry out an aspiration at the site of the vertebral collapse. The CT scan was an appropriate investigative technique as a metastatic cause was being investigated, having been raised by the Shetland hospital. What Professor Gilbert saw clearly was a collapse of the L3 and L4 vertebral bodies with the intervening vertebral disc having been destroyed; leaving no gap between them. This explains the possible 'misinterpretation' of the earlier x-ray as showing the collapse of one vertebral body. The CT scan had also identified a mass, described as a para-vertebral mass extending into the psoas muscles and the vertebral canal. The vertebral canal was thus compromised by the protrusion of bodies into it. Normally where there is a suspected infection in a disc an MRI scan would be carried out. That is the diagnostic tool of choice. However what was suspected in Mrs Dalziel's case up until then was a possible metastatic cause of the collapse. In Mrs Dalziel's case, however, the appearances were so gross that, according to Professor Gilbert, they were easily diagnosed from the CT scan. Professor Gilbert reported her findings thus (production 3, page 172): "CT shows destruction of the vertebral bodies of L3 and L4 with calcification and protrusion of the posterior aspect of the vertebral bodies into the spinal canal. The canal is reduced to one third its normal diameter. There is extensive calcification in both psoas muscles and anterior to L3 4. The right psoas muscle has ill defined margins and is enlarged. The appearances are those of

extensive infection with associated involvement of both psoas muscles more marked on the right side than the left. TB should be excluded."

[67] As a result of these findings there was a discussion with the orthopaedic surgeons and it was decided to involve a specialist in neurosurgery. Mr Labram was contacted whilst Mrs Dalziel was still in the CT room and after discussion of options, the emergency bone biopsy was carried out by Professor Gilbert. This involved placing a bone biopsy needle in the centre of the L3 /4 vertebral bodies. 4ml of "frank pus" was aspirated and this was sent to bacteriology to identify the cause of the infection.

[68] Thereafter Mrs Dalziel was transferred to the care of the neurosurgeons. On 23 November 2002 Mr Labram carried out an operation, known as a laminectomy, in the area of these vertebral bodies

[69] Mr Labram explained to the inquiry his decision to carry out this operation as being to deal with compromise of the spinal cord. His requirement to justify his decision was because Mr Jaffray had suggested that he might not have operated but rather have treated the infection with antibiotics. Mr Labram suggested that such a conservative approach might be appropriate in some cases but in Mrs Dalziel's case he considered two issues indicated that surgery was appropriate. Firstly the fact that Mrs Dalziel was suffering from neurological signs and symptoms (affecting her lower limbs with her being unable to straight leg raise); and secondly the presence of pus. Mr Labram described it thus (at page 20 15/12/05) "If there is pus and it is small pus and there were no neurological deficits we don't operate but make sure that we isolate the organisms and we do that with antibiotics and if they develop a neurological deficit and are not getting better I might go in and operate, but if they come in with a neurological deficit with a collection then I would definitely operate". I can see no justification for criticising this decision to operate and ultimately did not understand any of the parties to do so.

[70] By the time of the laminectomy operation the bacterium causing the infection had been isolated by the microbiologists and reported as staphylococcus aureus. This was said to be sensitive to all standard antibiotics, a combination of which (penicillin, flagyl and gentamicin) had already been started on admission on

22nd November 2002. As Mr Jaffray put it (24 August 2005 pp 33/34) "You make strenuous efforts to find the offending organism. I can tell you that often you can't get that and you are left guessing, which is a dangerous business….so they got the bug and they got the sensitivity, so that would be standard…. [they] identified what antibiotics were going to kill it … that's the keystone of maybe all spinal infections that I see.[You] get that organism and you hit it hard by intravenous antibiotics and for as long as necessary and hard as necessary."

[71] This laminectomy procedures are detailed in the neurosurgery records (page 28, production 3) and described in detail (from page 23 – 15/12/05) in Mr Labram's evidence. In addition to raising some questions as to the need for this operation on behalf of the family the question was posed whether the appropriate operative procedure was followed and in particular whether it would not have been better for a supine approach to have been followed. This was raised because the prone procedure adopted made access to the psoas muscles more difficult for the surgeon. I am satisfied on the evidence at the enquiry that the operation was justified and that there is no justifiable criticism of the surgeon's approach. Mr Labram dealt with these issues by conceding that if the purpose of the operation had been solely to access the psoas muscle then a supine approach would have been appropriate. However, what he was primarily intending to do was to decompress the neural elements and also clean out the adjacent area to give Mrs Dalziel the best opportunity to recover full use of her legs. Mr Labram's view was that generally when the area around the neural elements is cleaned of pus and other material and any infection is treated with an appropriate antibiotic, matters will resolve with the infection being walled off or contained. This is what a later CT scan showed indicating that the body was dealing with the infection which would be expected to recede (page 27 15/12/05). In simple terms the operation involved incisions from the posterior, creating a window in the tissue that covers and surrounds the spinal cord at the L3/L4 level. This allows access to drain the pus and remove granulation tissue from the dura (or covering of the nerve roots). Mr Labram reported finding some granulation tissue and some pus antereolaterally but with little posteriorly. Swabs were taken for culture and the granulation tissue stripped out and also sent for culture. The dura was opened to make sure that there was no intradural pus and was noted to be clean.

[72] Following surgery Mrs Dalziel improved clinically, being able to get out of bed and sit in a chair. Initially the results of routine tests were satisfactory with no significant concerns being expressed by the neurosurgeons who were still treating her. Mr Labram was on leave from 14th December 2002 but was invited to refer to the records and to comment on Mrs Dalziel's condition following the operation both before and after he was on leave.

[73] Mr Dalziel, in his evidence, accepted that Mrs Dalziel looked well after the operation and that there was no change in that appearance up to, he thought, 18th December 2002 (page 35 – 15/8/05) when, sometime late in the afternoon, he became aware of an increase in the number of doctors attending her. I suspect that this may have been 17 December as Mr Dalziel was aware that the doctors treating her had became concerned about her failure to pass urine for 24 hours, which is documented as being on 17 December (p 32, Production 3). It was suspected that she was suffering from kidney failure. This was the first time that Mr Dalziel had any appreciation that his wife's life might be in danger. All of the doctors who have commented on this post operative period agree that Mrs Dalziel appeared to be making a good recovery following the operation. Although some questions were asked (particularly of Dr. Labram) which suggested some criticism of the doctors at Aberdeen Royal Infirmary failing to notice the presence of infection following the operation, I do not understand those criticisms to have been sustained; and I consider it unnecessary therefore to detail all the tests which were carried out following the operation. Those that I mention are significant only to an understanding of the causation of death in this case.

[74] It became clear during inquiry that there are gaps in the clinical notes recording Mrs Dalziel's condition following the laminectomy particularly for a period from 26th November 2002 (when a PICC line for the administration of intravenous medication was inserted) until the records became fuller again on 3rd December 2002. Relevant test results are, however, filed in her records and relevant nursing notes and observation charts are also in place. The only issue is that the clinical notes might have been fuller. I am not satisfied that any real criticism can be made of the hospital albeit it may have made the leading of evidence more difficult. What is relevant for my determination is whether the paucity of these records could be said to have

compromised Mrs Dalziel Dalziel's recovery of disclosed a want of appropriate care. I am not satisfied that there was any evidence that they have; nor has any difficulty in the interpretation of the development of underlying processes affecting her been created. The post-operative notes there are consistent with a general improvement in Mrs Dalziel's condition. They record that on 11th December 2002 Mrs Dalziel managed to get out of bed; and on 12th December that she was mobilising with a frame.

[75] The next significant event occurred on 16th December 2002 when an MRI was carried out. Mrs Dalziel had been waiting for this procedure since 9th December. I was invited to infer that the lack of urgency confirmed that she was patently well, and that certainly seems to be the way all the evidence points. The evidence was that had it been otherwise an MRI scan would have been made available at an earlier point (that is if it was seen as an emergency – see Appendix II). Although the medical records produced for the inquiry did not contain any report of this MRI Professor Gilbert (page 24- 20/2/06) was able to bring a copy to court (Production 35). This report was by Dr. Alison Murray, one of Professor Gilbert's consultant colleagues who did not give evidence. However Professor Gilbert reviewed the images, having also brought them to court. She considered they did not disclose anything new. She did not disagree with her colleague's report which summarised the images as showing that the L4 vertebral body was abnormal with collapse and marrow oedema typical of vertebral osteomyelitis. The previous laminectomy at that level was apparent and it was noted that there was an angulated kyphosis (which according to Mr Jaffray's evidence would only take place when the spinal infection was under control) with the vertebral body protruding posteriorly into the spinal canal. A loculated extra-dural fluid collection, typical of an abscess, extending from the right L4/5 facet joint, both posteriorly and medially could also be seen. Inferiorly the abscess extended on either side of the L5 spinal process. This was compressing the cauda equina and, combined with the collapsed vertebrae, was causing severe spinal stenosis at the level of the inferior aspect of the L4 body. When she reviewed the images, Professor Gilbert (page 33 – 20/2/06) noted the fluid collection, which she thought was probably the result of surgery. It may have been an abscess, as reported, but may have been post-operative protein (which accumulates at the site of surgery as part of the body's healing process).

[76] On 17th December 2002, the day following the MRI, another para spinal aspirate was carried out and the sample appeared macroscopically clear and on testing was found to be clear of infection (that is no organisms were cultured). By that time, of course, Mrs Dalziel had been on antibiotics for almost 3 weeks and the fact that the sample appeared clear may be misleading. I heard evidence that it is hard to grow (or culture) organisms from samples where a patient has been on antibiotics for so long. There was, however, no evidence from a bacteriologist on this point.

[77] As indicated, on 17th December 2002, it is clear from all the evidence that the doctors became concerned about Mrs Dalziel's general condition as she was not passing urine. The biochemistry results from that date demonstrate that this lady was suffering from renal failure. Although Mrs Dalziel had failed to pass urine for 24 hours up to 17th December, the biochemistry results for 16th December are described by Mr Labram as "patently normal". At around midnight on 17th and then into the 18th December Mrs Dalziel was referred to renal specialists and ultimately on 20th December she was transferred to the intensive care unit.

[78] On 18 December 2002 Mrs Dalziel was reviewed by a Dr Millar who, I understood was a renal specialist (he did not give evidence). His notes appear in the records and were spoken to by other witnesses. He also discussed the case with Professor Gilbert. He recorded that Mrs Dalziel had developed acute renal failure secondary to rhabdomyolysis. Dr Millar's note (page 38 of production3) is that the precipitant of the rhabdomyolysis was unclear. I regret to say that despite this extensive and detailed inquiry, in my view, that remains an apt conclusion. Dr Millar's note describes potentially relevant events as being: Blood transfusion; MRI scan (he queried whether gadolinium, which could be implicated, had been used to enhance the contrast, however I am satisfied from the evidence that it had not); the abscess (from the vertebral infection); and a fall on her right hip, which is not further described and about which I heard no evidence.

[79] Dr. Peter Bryce Randalls from the intensive care unit at Aberdeen Royal Infirmary gave evidence at to the inquiry about the final stages of Mrs Dalziel's illness. On 21st December 2002 a blood sample was taken which, when analysed, indicated the

presence of an organism which had not previously been detected in any of the testing which had been carried out. This was the gram-negative bacillus enterobacter aerogenes. This is an organism which is generally found in the lower bowel and whilst there is normally harmless. However there are some circumstances where it can enter the bloodstream and this poisoning of the blood can, through various mechanisms, lead to multi organ failure and death. This is a topic which will be explored in more detail later in the discussion on infectious processes.

[80] It is helpful to record here, however, that at the stage that this gram-negative bacillus was detected, Mrs Dalziel was being treated with an antibiotic (Imipenem) which this organism was susceptible to, and had been receiving this drug since the afternoon of 21st December 2002. It is also proper to record that this gram negative infection is not directly related to the staphylococcus aureus infection which was associated with her initial admission to hospital and which was involved in her osteomyelitis.

[81] On 18th December 2002 Dr. Millar had decided that Mrs Dalziel should commence dialysis. He had also requested a needle biopsy of the right psoas muscle. On 19th December he was involved in a review of the radiology with Professor Gilbert. The professor described this review to the inquiry and also demonstrated, with the various images produced, how she and Dr Millar explored what might be happening to Mrs Dalziel. She was asked in particular about the MRI scan from 16 December 2002 and whether that disclosed any evidence of active infection. Her evidence was that whilst there was evidence of infection she was unable to say whether it was active. She was able to say that the collection shown in the right psoas muscle looked very 'organised' and 'walled off'. It had the appearance of having become calcified since first presentation. Her evidence was that when infections are being successfully treated they do tend to become organised and walled off in that way. Walling off is he classic reaction of the body to infection. It is the way in which the body attempts to heal itself. Although she did not consider that she was expert in this area of medicine, she described the body attempting to wall off and isolate the harmful organisms and then once walled off the body tried to kill off the bacteria. By this time Mrs Dalziel had had a second CT scan and there was evidence of "stranding" (creation of fine strands of fluid) in the abdominal fat. This she described as a very non-specific sign of inflammation or oedema. The right psoas muscle was felt not to

be the source of the acute (presumably new) infection. Because of the difficulty in interpreting what was going on, Doctor Millar requested a further biopsy in the hope that infected material would be aspirated and identified. This was planned for 19 December.

[82] Professor Gilbert had a clear recollection of her discussion with Dr. Miller whose main concern was that the patient had been getting better but was now deteriorating. He was looking to see what processes might be going on that had been overlooked. It had been thought that the deterioration might have been associated with the original infection but that struck the doctors as unusual as she had been responding to the antibiotic regime and had clearly been getting better. There was no explanation as to why her condition then deteriorated. For this reason the doctors wondered whether there might be another source of infection. The further aspiration of the psoas muscle was designed to clarify this; however there was no sign of any other source of infection. Professor Gilbert (pages 43/44 – 20/02/05) suggested that by exclusion, as no other source of infection was found, the psoas muscle must have been the source of infection. However she readily conceded that this was not really in her area of expertise.

[83] Despite renal dialysis being initiated Mrs Dalziel's condition progressively deteriorated, with a persistently low blood pressure, to the extent that she was admitted to the intensive care unit at 22.12 hours on 20th December 2002. In addition she suffered a small gastro intestinal haemorrhage producing typical coffee ground aspirate from the stomach (into which a naso-gastric tube had been inserted). Despite active intensive care, she failed to improve. Her low blood pressure persisted. A blood culture (from a sample taken on 21st December 2002) revealed the presence of a gram-negative bacillus (enterobacter aerogenes) and it was concluded that the deterioration since the onset of renal failure was caused by septic shock. Despite appropriate antibiotic therapy she continued to deteriorate with a progressively slowing heart and died at 07.00 hours on 22nd December 2002.

[84] Before moving on to my discussion of the evidence as to the cause of death, I wish to deal with one further incident which occurred on 21st December 2002 at about 14.30 hours in the afternoon, about which there was considerable speculation at the

inquiry. Mrs Dalziel was being given what is known as a synacthen test. This is a procedure carried out prior to intubation of a patient to check whether there is any contra-indication to such a procedure (which was being actively considered at that stage as an alternative to the then current level of support which involved non-invasive ventilation of Mrs Dalziel). Very unusually she had an adverse reaction to the test and during that reaction and attempts to carry out an emergency intubation; Mrs Dalziel aspirated her stomach contents. At an early stage in the inquiry this was suggested as a possible source of the enterobacter infection which, as will be seen, is implicated in her death. However, Dr. Randalls (from the intensive care team dealing with Mrs Dalziel) suggested that this aspiration was not a likely source of the enterobacter, principally because of the short time between this incident and the time of the taking of the blood sample, which tested positive for enterobacter. This view was endorsed by Dr. Rubenstein who of all the witnesses had most experience in the field of infection. He concluded that there was insufficient time between the incident and the taking of the sample for enterobacter to have entered Mrs Dalziel's blood system. Although Dr Rubinstein's evidence was that the treating doctors first became aware of the enterobacter infection at about 04.00hrs on 22 December 2002, the sample from which that result was cultured was actually taken at about 15.00 hrs on 21 December 2002, that is within ½ hour of the aspiration event.

Post Mortem

[85] A post mortem examination and dissection was then carried out on 23 December 2002, with the consent of the family, by witness Dr. Edwards. Unusually for an inquiry of this complexity the Crown chose to rely upon the original reports of that examination and further enquiries, prepared by Dr Edwards at the time. These were contained in the medical records for Mrs Dalziel produced at the inquiry. There are two separate reports. The first, dated 31 December 2002 following dissection, the second dated 27 January 2003 following histology and bacteriology. A further neuropathology and histology report on the lumbar spine from a Dr McKenzie (not a witness) dated 13 May 2003 can also found in the records. These comprise pages 15-17, 23 – 25 and 26 – 28 of the general practice records (production 1).

3. THE ROLE AND FUNCTION OF THE EXPERT

[86] It is appropriate that I say something about my general approach to the expert evidence which so dominated the inquiry. It is the responsibility of the Crown in a fatal accident inquiry to lead evidence to satisfy the Sheriff, on the balance of probabilities, as to the cause of death and any other matters which are relevant for the purposes of Section 6 of the Fatal Accidents and Sudden Deaths Inquiry (Scotland) Act 1976.

[87] In this case parties, including the Crown, led expert witnesses who gave (or at least purported to give) evidence on the following areas:

The cause or causes of death;

The appropriate administrative systems to operate in general medical practice;

The appropriate response of a general practitioner to a patient with complaints of lower back pain.

The law applicable to expert witnesses

[88] The issue of the law applicable to expert witnesses was recently reviewed by Lord Nimmo-Smith in his judgement in *McTear -v- Imperial Tobacco Limited* (2005 2 S.C. at pages 135 to 142). I consider that his comments albeit in relation to a civil proof are a timely reminder of the proper role and purpose of expert testimony in the law of Scotland and are equally applicable to a fatal accident inquiry.

[89] In *McTear*, his Lordship was particularly concerned with the proposition that in his evidence a clinician was entitled to have regard to epidemiological publications containing data which fell outwith his immediate area of expertise. His Lordship disagreed with the pursuer's proposition that as a matter of common sense and on the authority of *Main v Andrew Wormald Limited* 1988 SLT 141 for clinicians not to be able to refer to such publications to supplement their own experience would be ludicrous.

According to his Lordship (at paragraph 5.14, page 141) the proposition was that:

"They must be able to refer to what they read in the *British Medical Journal* 'and things like that' as forming their overall opinions and information".

[90] His Lordship did not agree with such a general proposition responding (at paragraph 5.16):

"It… appears to me to be a question of fact to be decided on the evidence in a particular case whether or not published material which has been put to a witness did or did not lie within his field of expertise."

[91] His Lordship then drew attention to the Lord Justice Clerk's opinion in the reclaiming print version (rather than the SLT report) of the judgement in *Main* as to the general principles of admissibility and effect of an expert's opinion evidence. It is to those general principles that I now turn.

[92] Lewis in *The Manual of the Law of Evidence in Scotland* (at pages 47 to 49) states the position thus:

"The term opinion evidence is generally used in the law of evidence in a technical sense, and indicates a species of evidence conveniently described as testimony of experts and regarded as admissible in certain circumstances, the particular limits of which cannot be rigidly defined. Whenever the subject matter of enquiry is of such a nature that special knowledge is required in order that it may be understood by the tribunal which has to decide on conflicting views, evidence is admissible of *ex post facto* opinions and theories formed by witnesses possessing peculiar knowledge or skill in the matter in question. The evidence of skilled witnesses or experts is admissible whether the inquiry involves decisions and facts of a technical or scientific nature. The tests of its relevancy are

(1) That the opinion is based on the principles of some recognised craft or science in relation to which the witness may be cross-examined on his opinion; and

(2) That the subject matter of the opinion is not such that the tribunal is bound to take judicial notice of it….

No rule can be laid down beforehand as to what persons may be regarded as qualified to give evidence of opinion, but there should be in the witness an extensive and accurate state of knowledge and experience of the subject involved, derived from study or practice, or both."

[93] In *Davie-v-Magistrates of Edinburgh*, 1953 S.C. 34 a number of different issues in relation to expert evidence arose. Lord President Cooper (at page 40) rejected a submission that where no counter evidence on the science in question had been advanced for the pursuer, the court was bound to accept the conclusions of an expert witness for the defenders saying that such an approach would be 'contrary to the principles in accordance with which expert opinion evidence is admitted'. These principles were then set out as follows:

> "Expert witnesses, however skilled or eminent, can give no more than evidence. They cannot usurp the functions of the jury or Judge sitting as a jury, any more than a technical assessor can substitute his advice for the judgement of the Court … Their duty is to furnish the Judge or jury with the necessary scientific criteria for testing the accuracy of their conclusions, so as to enable the Judge or jury to form their own independent judgement by the application of these criteria to the facts proved in evidence. The scientific opinion evidence, **if intelligible, convincing and tested** [emphasis added] becomes a factor (and often an important factor) for consideration along with the whole other evidence in the case, but the decision is for the Judge or jury. In particular the bare *ipse dixit* of a scientist, however eminent, upon the issue in controversy, will normally carry little weight, for it cannot be tested by cross-examination nor independently appraised, and the parties have invoked the decision of a judicial tribunal and not an oracular pronouncement by an expert."

[94] These are important conditions for the admissibility of expert evidence and it is the un-testable nature of some of the opinion evidence led at this inquiry

which has caused me some difficulty. However eminent the source, as the Lord President indicated in *Davie*, that

> "Will normally carry little weight, for it cannot be tested by cross-examination nor independently appraised"

This explains my rejection of some of the explanations tendered in this inquiry for the death and in particular the link between Mrs Dalziel's original spinal infection and her death. I am not critical of the experts who have proffered opinions on the subject in good faith. I simply record that there are limits to what I can make of such un-testable opinion evidence, which is in any event questionably admissible.

[95] Lord Rodger, as Lord President, set out the issue thus in D*ingley -v- Chief Constable, Strathclyde Police*, 2000 S.C. (HL) 77, 1998 S.C. 548 when (at page 555 of the 1998 report) after referring to *Davie* he said:

> "Perhaps the essential point is that parties who come to court are entitled to the decision of a judicial tribunal. Such a decision may take account of many rather intangible things such as the demeanour of witnesses and the way that they gave their evidence, but, whatever its components may be, such a decision must be reasoned. As Lord Cooper says [in *Davie*] an oracular pronouncement will not do."

At page 604 Lord Rodger made two further general observations:

> "First, there was a certain amount of evidence to the effect that certain views on causation were very widely held, or were no longer widely held. If a particular process of reasoning is widely acceptable, then that I think may be persuasive for a court. But the fact that a particular view is widely held, without any persuasive explanation as to why it should be so held, and constitute a conclusion, does not appear to me to be a matter to which a court should give significant weight. Rather similarly, the fact that a particular view was or is held by someone of great distinction, whether he is a witness or not, does not seem to me to give any particular weight to his view, if the reasons for his coming to that view are unexplained or unconvincing. As with judicial or other opinions, what carries weight is the reasoning, not the conclusion."

[96] It is worth drawing attention to three further aspects of expert evidence which I consider to be relevant in this inquiry. Firstly the function of the judge in relation to the evidence of an expert; secondly, the independence of the expert; and thirdly those aspects of the case where expert evidence may be neither necessary nor appropriate.

Function of the judge in relation to expert evidence

[97] As Wilkinson puts it in *The Scottish Law of Evidence* (at pages 65 and 66) referring to *Davie*:

> "The point Lord President Cooper was concerned to make is sometimes overlooked. The function of the expert is not to present ready-made conclusions. The decision on the various issues in the case, including the issues of fact in the resolution of which the expert may assist, is for the judge or jury. The expert must not usurp their function".

[98] This position is dramatically illustrated in the criminal case, *Ingram v Macari* 1982 SCCR 372, which was a prosecution for shameless indecency. On appeal it was held to be the sheriff's duty to decide for himself whether certain publications were likely to deprave and corrupt and that expert evidence on the question was inadmissible.

Independence of expert

[99] Lord Macphail (as he now is) in the textbook *Evidence,* at S17.10 C, stets out the following proposition:

> "The courts require of expert witnesses the highest standards of accuracy and objectivity"

[100] In support of this proposition he relies on *Preece v HMA* 1981 SCCR at 783. That case is also referred to by Lord Nimmo-Smith in *McTear* (at page 139) and by Lord Caplan in *Elf Caledonia Limited -v- London Bridge Engineering Limited,* 2nd September 1997 (unreported). Their Lordships each refer to a passage in the Lord Justice General's opinion in *Preece* (which was omitted from the published report). When concluding that a witness had been

discredited, not only as a scientist, but also as a witness upon the accuracy, fairness and objectivity of his evidence he says:

> "This was in our judgement, conduct on the part of an expert witness which demonstrated a complete misunderstanding of the role of scientific witnesses in the courts, and a lack of the essential qualities of accuracy and scientific objectivity which are normally to be taken for granted."

[101] *Preece* was of course a criminal case but the nature of proceedings does not alter the duties of experts. As an example, in the *Elf Caledonia Limited* case Lord Caplan referred, with approval, to the delineation of duties and responsibilities of expert witnesses as set out in *National Justice Compania Naviera S. A. –v- Prudential Assurance Company Limited (The Ikarian Reefer case)* [1993] 2 Lloyd's Rep. 68, where Cresswell J says (page 81):

> "The duties and responsibilities of expert witnesses in civil cases include the following:
>
> (1) Expert evidence presented to the court should be, and should be seen to be, the independent product of the expert uninfluenced as to form or content by the exigencies of litigation…
>
> (2) An expert witness should provide independent assistance to the court by way of objective unbiased opinion in relation to matters within his expertise…
>
> (3) An expert witness … should never assume the role of an advocate.
>
> (4) An expert witness should state the facts or assumption upon which his opinion is based. He should not omit to consider material facts which could detract from his concluded opinion…
>
> (5) An expert witness should make it clear when a particular question or issue falls outwith his expertise.
>
> (6) If an expert's opinion is not properly researched because he considers that insufficient data is available, then this must be stated with an indication that the opinion is no more than a provisional one… In cases where an expert witness who has prepared the report could not assert that the report contained the truth, the whole truth and nothing

but the truth without some qualification, that qualification should be stated in the report."

[102] I mention this principally in relation to the criticisms made by Mr Holmes of the evidence of the family's 'expert', Dr Cochran. Mr Holmes submitted that Dr Cochran was unable to look at matters in an objective way; that he adopted extraordinary language to discuss the actions of his professional colleagues; and that I should consider discounting the totality of his evidence. In his report, dated 24th May 2004 (which formed production 9) Dr Cochran concluded "I consider the lack of any apparent system within the Practice to record, trace or act on obviously abnormal results extremely alarming. This has had disastrous consequences for the late Gladys Dalziel. Investigation to date is unsatisfactory [this is a reference to the internal investigation by the Health Board]. There is a clear possibility that the Practice may continue to have deficient systems and in my opinion there is a public interest issue remaining unless the Practice is formally investigated by means of a fatal accident inquiry."

[103] I will revert to Dr. Cochran's opinion when I assess the general weight to be placed on his evidence. For the moment it is sufficient to record that this concluding paragraph at the very least suggests a failure to understand the requirements of objectivity and independence placed on expert witnesses and the limits to their function. They should not be advocates for a party's cause nor should they use unnecessarily emotive language in expressing their views.

Unnecessary expert evidence

[104] Dickson in *A treatise on the Law of Evidence in Scotland* states at paragraphs 397 to 399:

> "Another exception to the general rule against examining witnesses in matters of opinion occurs when the issue involves scientific knowledge, or acquaintance with the rules of any trade, manufacture or business with which men of ordinary intelligence are not likely to be familiar… in conducting such examinations care must be taken not to encroach on the province of the jury by laying before them an opinion

founded partly on inferences which do not involve the peculiar skill or knowledge which the witness is supposed to possess".

[105] I have already touched on part of the criteria set out here, namely that opinion evidence is admissible from those witnesses with scientific expertise (the true expert witness) and those who speak to an acquaintance with the rules of trade manufacture or business (sometimes referred to as the man of skill). But only in relation to matters within that area of expertise and in respect of matters with which the fact-finder (be it judge or jury) is not likely to be familiar. As an example of the implications of this requirement, in the unreported case of *Donnelly versus FAS Products Limited*, 19th March 2004, Lord Brodie heard evidence, which was led without objection, from an occupational therapist who provided "services reports" in support of claims under Sections 8 and 9 of the Administration of Justice Act 1982. The introduction to the witness's report identified the purpose of the report as being to:

> "Detail the help and assistance required by the pursuer following her accident, provided by her immediate family; quantify help and assistance required; detail the help and assistance required in the future; and estimate financial costs involved in any future help and assistance required."

[106] Lord Brodie declined to rely upon her evidence. He did so partly because he was not satisfied that the evidence of the witness met the test of being expert evidence set out in the passages from Dickson quoted above. At paragraph [60] of his opinion Lord Brodie puts it thus:

> "I accept that [the witness] is a person who has a theoretical acquaintance with and practical knowledge of the science or discipline of occupational therapy… what I do not accept is that this particular case gives rise to an issue which "involves scientific knowledge, or acquaintance with rules of any trade or manufacture or business with which [persons] of ordinary intelligence are not likely to be familiar".

[107] Interestingly, Lord Brodie also declined to take this evidence into account on the basis of the lack of reasoning for the witness's conclusions, an issue I have already dealt with above.

[108] In relation to Mrs Dalziel's death, it seems to me that there were certain aspects of the evidence of the GP 'experts' who were led for the family (that is the evidence of the witnesses Drs. Cochran, Thornton and Rutherford) in relation to the systems for dealing with blood test results and patients' records that strayed somewhat into territory which was not beyond the experience of persons of ordinary intelligence and accordingly where their 'expertise' as general practitioners is somewhat redundant. Accordingly to the extent that I consider their evidence to have dealt with matters within ordinary experience, I have taken the view that I am entitled to base my decisions on everyday experience and not simply upon the 'opinions' which these 'experts' expressed.

4. DISCUSSION AS TO THE CAUSE OF DEATH

[109] At the time, pending completion of the autopsy Mrs Dalziel's death was certified by one of the attending doctors as:

I (a) Multi-organ failure;
(b) gram negative septicaemia;
(c) para-spinal abscess
II Rhabdomyolysis.

Following the autopsy examination Dr Edwards considered that the cause of death should properly be stated as multi-organ failure attributable to septicaemia due to a right psoas abscess. Following histology she considered that candida pneumonia should also be included as a cause of death.

[110] As all of the parties to the inquiry recognised, determining the cause of Mrs Dalziel's death is a complex matter. It is, however, crucial in that what I accept the cause of death to be determines whether I am entitled to make findings as to systems failures, reasonable precautions or any other facts relevant to the cause of death. Firstly I will set out the evidence of the only pathologist from whom the inquiry heard; thereafter I will address the evidence of those other medical experts which may be relevant to this crucial issue; then I will summarise the parties' representations in relation to what I am entitled to find under the heading "Cause of Death", for the purposes of Section 6(1) (b) of the Fatal Accidents and Sudden Deaths Inquiry (Scotland) Act 1976; and finally I will set out my conclusions as to the cause of death.

The Pathologist

[111] In terms of Section 6 (1) (b) of the 1976 Act the cause or causes of death must be established and where necessary related to any accident resulting in the death. The time, place and cause of death are the essential findings in any determination made by a sheriff at a fatal accident inquiry. In the overwhelming majority of inquiries the evidence as to the cause or causes of death is relatively straightforward and

encompassed in a report or oral testimony from a pathologist who has carried out the autopsy. Only exceptionally will that cause of death be a live issue and the primary focus at the inquiry, as it has been in this case.

[112] The primary responsibility for leading evidence to satisfy me as to the cause of death falls on the Crown. In this case Mr McKenzie called Dr Edwards (being the pathologist who had carried out a post-mortem examination of the deceased on behalf of the hospital) to give evidence. Her evidence was given prior to that of other expert medical witnesses. Her evidence may not be as complete as it might have been had she been recalled and invited to comment on other medical evidence that appeared relevant. In summary her position was that if she were, at he time she gave evidence, to have completed a death certificate she would set out the cause in the following manner:-

I(a) Gram-negative Septicaemia;

I(b) Right Psoas Abscess;

I(c) Epidural Abscess; and

II Candida Pneumonia.

The hospital doctor in granting the death certificate had specified multi-organ failure as the primary cause of death and Dr Edwards had agreed with this in her initial report. She accepted in evidence that whilst that is a correct description of the mechanism of death, in accordance with recognised practice what should be set out is the cause of that multi-organ failure. Her evidence was that she considered that the gram-negative septicaemia was the significant cause of death; and that the source of that septicaemia or systemic infection in the blood was an abscess on the right psoas muscle, that abscess being a direct extension of an abscess between the dura matter on the spinal cord and the vertebral canal. As will be seen I am not satisfied that that conclusion is consistent with all the evidence led.

[113] Dr Edwards is currently a consultant pathologist at Dundee University although at the time of her initial involvement in Mrs Dalziel's case she was a specialist registrar in pathology at Aberdeen Royal Infirmary. She described the following potentially significant findings in her report on the autopsy:

- a probably undiagnosed high blood pressure (which she considered not to be relevant to the death);
- oedema on the lungs suggestive of pneumonia;
- a nutmeg liver;
- inflamed lining of the oesophagus;
- a duodenal ulcer; and
- kidneys within the normal range (which she said was not inconsistent with renal failure)

At autopsy she also found evidence of the laminectomy operation carried out by Mr Labram and describes the left psoas muscle looking macroscopically normal but the right psoas muscle appearing macroscopically to be extremely pale with pus present, which she described tracking down into the inguinal canal. Her summary was that Mrs Dalziel had both hepatic and renal failure (as was known by the doctors treading her) and there was evidence of congestive cardiac failure. Her conclusion was therefore that Mrs Dalziel did die from multi-organ failure which she attributed to septicaemia due to a right psoas abscess. She also concluded that the evidence of Mrs Dalziel's falling haemoglobin level and presumed gastrointestinal bleed were associated with her duodenal ulcer, although there was evidence both of oesophagitis and gastritis. The foregoing summary is based on naked-eye appearance only.

[114] Dr. Edwards explained that the interpretation of her findings was complex. She expanded upon these findings in evidence (page 106 – 16/8/05) saying that in her opinion the cause of death was **septicaemia.** She explained that Mrs Dalziel died with multi-organ failure, the end-stage being cardiac failure with signs of oedema in the lungs and chronic venous congestion in the liver. But the **cause** of that multi-organ failure was the well demonstrated septicaemia which was, therefore, the significant cause of death. The source of that septicaemia was initially unclear as she described two possible sources, namely pneumonia and the psoas abscess. Mrs Dalziel's pneumonia was of the fungal variety rather than the more common bacterial variety. Dr Edwards accepted that Mrs Dalziel's fungal pneumonia could cause septicaemia but because bacteria rather than fungus was grown in the blood

cultures she later discounted pneumonia as a cause of the septicaemia. She was also clear in her evidence that the (original) infection in Mrs Dalziel's spine was not the cause of the septicaemia. She favoured the documented abscess as the cause of the septicaemia. She thought that Mrs Dalziel's pneumonia would have contributed to her death because it was very severe. As I have indicated, her second report contains the histology results whilst noting that micro-bacterial investigations and neuropathology results are still awaited. The histology samples showed a diffuse candida-pneumonia in both lungs and this was confirmed by bacteriology. Dr. Edwards could not be sure of the cause of that candida-pneumonia. As I have commented a fungal cause is quite unusual and even more unusual in a 52 year old lady who Dr Edwards said was not known to be immunosupressed. Doctor Edwards did indicate, however, that candida-pneumonia can occur due to prolonged antibiotic treatment or in patients with central venous catheters (both of which conditions applied to Mrs Dalziel).

[115] That notwithstanding, Dr. Edwards (page 108 – 16/8/05) remained of the view that the cause of Mrs Dalziel's death was septicaemia due to right psoas abscess. To set this out in standard form for a death certificate, she would record:

I (a) Septicaemia
I (b) Right Psoas Abscess

[116] She would also record pneumonia in Part II of the certificate because that would have contributed to the death. Cardiac failure and the multi-organ failure are not included in the death certificate as they represent end events rather than causes.

[117] In relation to her view that the septicaemia was due to the right psoas abscess Dr. Edwards indicated (page 115) that the gram-negative enterobacter bacilli which had been detected in the ante-mortem blood culture results (first mentioned in relation to the sample taken on 21 December 2002) occur most commonly in urinary tract infections, bowel problems or deep seated abscesses.

[118] Dr. Edwards was referred to various microbiology reports and in particular the report of the aspirate taken on 23rd November 2002 from the area between the L3

and L4 vertebrae and which showed a profuse collection of gram-positive cocci (staphylococcus aureus). The microbiology report for the catheter urine sample taken on 6th December 2002 (and reported the following day) shows candida fungus in the urinary tract. The microbiology report for the para-spinal aspirate taken on 17th December 2002 (which I refer to in the chronology of significant events) reported on 19th December, shows pus cells on microscopic examination but no culture growth indicating that no bacteria were isolated. Finally she was referred to the blood sample taken on 21st December 2002 (reported on as I have explained at 04.00 hrs on 22 December but with the written report prepared post-mortem) which cultured gram-negative enterobacter aerogenes bacilli. In the light of all these results Dr. Edwards, in cross-examination (page 123 – 16/08/05) conceded that the septicaemia which she implicates as the primary cause of death, was a gram-negative septicaemia.

[119] Taking these results together Dr. Edwards accepted that the following summary of the position was fair: Mrs Dalziel had a gram-positive bacterial infection in her spine; she underwent an operation (laminectomy) during which pus was cleared from the operation site and also around that (but not according to the surgeon in the psoas muscle); following the discovery of a further collection of para-spinal fluid, a further para-spinal sample was taken on 6th December 2002 (and reported on the following day) which was a clear sample; Mrs Dalziel subsequently developed septicaemia, but that was a gram-negative septicaemia.

[120] The pathologist agreed that it was fair to conclude that the infection Mrs Dalziel had in her spine was not implicated in her septicaemia, stating "It was a different bacteria altogether" and that to be specific about the septicaemia implicated in her death it would be appropriate to say it was gram-negative septicaemia. That would, she said, be a more accurate statement of the cause of death than simply "septicaemia". She also conceded that the only way in which the psoas muscle abscess was implicated in this was that it was connected to the spinal infection which is what led to Mrs Dalziel being admitted to hospital.

[121] This, in my view, was a significant departure by this witness from the position that she adopted in her pathology report(s) and during evidence in chief. In his

submissions on behalf of Drs Krusche and Murphy, Mr Stewart suggested that prior to giving evidence to the inquiry Dr. Edwards did not appear to have considered that the septicaemia implicated in the death had a different causal agent from that causing the spinal infection. I am not sure that it would be fair to conclude that such a possibility had not been considered by the witness but certainly, having been asked to consider all the available results from ante mortem and post mortem tests, she did alter her position on this point.

[122] I should also say that I have reservations about Dr Edward's comment, in her pathology report that this lady was not immunosupressed. That was contrary to the evidence of other witnesses who were involved in her treatment. That does not, however, appear to be a matter of any great significance, albeit it may be relevant to the development of her pneumonia (at least according to the pathologist). Certainly on the basis of the evidence led all I could do would be to speculate as to its role. I am not satisfied that Dr Edward's evidence deals comprehensively with the connection between this lady's death and her pneumonia, particularly given the evidence that a candida fungus was found in her urine some significant time prior to her death (in the catheter urine sample taken on 6 December 2002).

[123] It is against this background that I have to consider Dr. Edwards further explanation of the role of the psoas muscle. When I attempted to clarify the position (page 125 – 16/08/05) she indicated that the assumption is that the gram-negative bacteria implicated in the septicaemia originated in the psoas abscess, which is therefore the source of that infection, from where it had entered the bloodstream and caused the septicaemia. When cross-examined by Mr Stewart with regard to the possibility of aspiration of the stomach contents following the synacthen test as a source of the gram-negative septicaemia she said "It is very unlikely… because it is in the large bowel to cause septicaemia by aspiration". She did accept, however, that it was possible that if Mrs Dalziel had candida in her upper airway, if that was aspirated into the lungs it could cause pneumonia which could develop extremely quickly. She was not sure, however, whether that could have progressed sufficiently quickly (that is between 14.30hours on 21st December 2002, when the synacthen test was carried out, until Mrs Dalziel died on 22nd December) to be the cause of the candida pneumonia implicated in her death. Dr Edwards disagreed with the conclusion of

Dr. Hunter's report (production 6) that the reaction to the synacthen test led to aspiration pneumonia and was the probable source of the gram-negative bacillus. She did, however, remain of the view that the pneumonia, which she described as very severe, was a very significant contributor to the death.

[124] Somewhat confusingly in her evidence Dr. Edwards, under cross-examination by Mr Hayhow also indicated (pre page 137) that the gram-negative septicaemia present at the time of death was caused by enterobacter entering the bloodstream and that that poisonous blood was the source of the abscess on the right psoas muscle. Again this was inconsistent with what she had previously said about the right psoas muscle being the source of the septicaemia and I am not at all convinced that this description is consistent with the descriptions we heard from other witnesses who have perhaps greater expertise in infectious processes. She also referred in this context to necrosis (death) of the psoas muscle which I understood she again connected with the enterobacter infection (page 139). Her final position was that the cause of death should be recorded as:-

I (a) Gram-negative Septicaemia
(b) Right Psoas Abscess
(c) Epidural Abscess (because that is where the psoas abscess extended from)
with a secondary contributory condition as
II Candida-Pneumonia.

Despite this being her final position in evidence, I have reservations as to how well that fits with her evidence as to the connection between the gram-negative septicaemia and the psoas muscle. However, given the evidence led about rhabdomyolysis at the inquiry, it is proper to emphasise that she makes no reference whatsoever to the involvement of rhabdomyolysis in the cause of death. On the basis of this witness' evidence I am only willing to find that death was due to gram-negative (enterobacter aerogenes) septicaemia and fungal (candida) pneumonia. That conclusion is influenced by the other evidence I heard relevant to the cause of death.

Other medical evidence relevant to the cause of death

[125] There was a significant amount of other medical evidence in relation to the cause of death. Not all medical witnesses commented directly on the cause of death and those who did not do so exclusively. Accordingly when I deal with their evidence which is relevant to the cause of death I also mention other evidence given by them germane to the issues dealt with at this inquiry. It must also be borne in mind that Dr Edwards was the only witness with expertise in pathology.

Doctor William Alexander Hamilton Hunter

[126] Doctor Hunter gave evidence at an early stage in the inquiry, shortly after I had heard from three of the four G.P.s involved in the care of Mrs Dalziel. His evidence was given in a relaxed and confident manner. He had become involved in the case at the instance of the procurator fiscal who had sought an opinion from him on the appropriateness of the procedures followed at Aberdeen Royal Infirmary after Mrs Dalziel's admission there. As can be seen from his entry in Appendix I, his background is in intensive care medicine and anaesthesia, having been a consultant in those fields for ten years. He had prepared a brief report for the procurator fiscal which formed production 6.

[127] In addition to commenting on the treatment received by Mrs Dalziel at Aberdeen Royal Infirmary he proffered opinion evidence on the sequence of her death. Other than commenting that following her transfer from the Gilbert Bain Hospital in Lerwick to Aberdeen Royal Infirmary it would have been preferable for her to have had an earlier CT scan and to have been commenced on antibiotics on the day of her admission, his opinion was that her medical treatment was appropriate. Such delay as there may have been was, he thought, probably not significant (given the likely long-term presence of the spinal infection). He noted that the gaps in the documentation in Aberdeen Royal Infirmary records. Generally, however, the correct investigations and treatments were instigated within a reasonable time-scale.

[128] His summary of the position was that following the surgery performed by Mr Labram, Mrs Dalziel's condition appeared to be improving slowly until 17th December 2002 on which date her blood pressure and urine function deteriorated. This was followed by deterioration in her liver function with drops in haemoglobin levels. She seemed to be bleeding in the gastro-intestinal tract and when admitted to the Intensive Care Unit on 20th December was in a precarious state being in multi-organ failure.

[129] Doctor Hunter was invited to speculate about the cause of death. His conclusion (page 5 – 23/8/05) was that post-operatively the cause of her deterioration appears to have been renal failure caused by rhabdomyolysis. Although the clinicians who certified her death suggested that rhabdomyolysis played a role in Mrs Dalziel's death, as I have commented the pathologist, Doctor Edwards' does not relate this condition to Mrs Dalziel's death. She, of course, attributes the death to gram negative septicaemia and candida pneumonia.

[130] Given the respective areas of expertise of Doctor Hunter and Doctor Edwards, I am not minded to include rhabdomyolysis in my findings as to the cause of death because I am not satisfied that the link between the rhabdomyolysis, the original spinal infection and the death is made out. I have concluded, from the evidence which I heard that this is no more than a theoretical possibility. Moreover, when Doctor Hunter gave evidence about rhabdomyolysis albeit he spoke of his experience in dealing with it, he did not set out the scientific basis for his conclusion that it was implicated in the cause of death in a manner which would allow that opinion to be tested.

[131] According to Doctor Hunter rhabdomyolysis is the process involved when an area of muscle that is severely damaged as a result of blunt force trauma or infection (or indeed reduction in the blood supply for whatever reason) dies and releases significant quantities of toxic enzymes (creatine kinase) which are harmful for the kidneys. Raised creatine kinase levels are documented in the Aberdeen Royal Infirmary records for Mrs Dalziel. Doctor Hunter postulates that she was suffering from rhabdomyolysis related to muscle necrosis in the

region of the spinal infection or the right psoas muscle (into which the infection had spread). He postulated that although the original infection may have been under control following the laminectomy and intensive antibiotic treatment, the muscle damage had already occurred and was on an irreversible path.

[132] Doctor Hunter did, however, accept that the proximate cause of Mrs Dalziel's death was the gram negative septicaemia, which he accepted was different from the original spinal infection. He postulated a mechanism for this infection related to the aspiration by Mrs Dalziel of her stomach contents on 20th December 2002 during the adverse reaction to the synacthen test whereby the enterobacter aerogenes bacillus (normally safely contained in the lower intestine) had been transported further up the digestive tract and entered the blood stream following the aspiration of her stomach contents during the adverse reaction to the synacthin test, possibly via her lungs. Thus he describes aspiration pneumonia as the probable source of the gram negative septicaemia which led to Mrs Dalziel's death. This aspiration pneumonia is not the same as the candida pneumonia described by the pathologist.

[133] This was not, however, the sequence of event in Mrs Dalziel's death according to the pathologist whose evidence in relation to the cause of death is in my view more persuasive. Nor is it clear, because it was never put to the Dr Hunter, how his theory copes with the evidence from the pathologist that Mrs Dalziel had a fungal pneumonia. Moreover, other witnesses' evidence raises doubt as to the likelihood of Doctor Hunter's sequence: particularly the persuasive evidence that the time between the documented aspiration event and the taking of the sample that produced the positive culture of the gram negative bacillus was too short for that event to be the source.

[134] Accordingly, whilst I found him a credible witness who was trying his best to explain the unusual circumstances of Mrs Dalziel's death, caution has to be exercised with those areas of his evidence which falls strictly outwith his particular area of expertise. I am, however, satisfied that he was well qualified

to comment on the general level of care received by Mrs Dalziel at Aberdeen Royal Infirmary, in relation to which he had no real criticisms.

Mr David Charles Jaffray

[135] Mr Jaffray was the witness with the greatest experience of spinal surgery. As can be seen from his qualifications (Appendix I) he was a consultant orthopaedic spinal surgeon of some 15 years experience and was based at a specialist spinal unit with post-graduate teaching responsibilities. He had contributed to a number of text books on spinal injuries, he was an examiner in orthopaedic surgery with the Royal College of Surgeons; he was an adviser to the National Institute of Clinical Excellence; and he was president of the British Cervical Spine Society. His main area of interest was in back pain in respect of which he worked with his hospital's radiology department to offer diagnosis and surgical rehabilitation to what he described as a "large group of often neglected and severely disabled patients". He also had a special interest in surgery of the cervical spine and had extensive experience of spinal injuries.

[136] I found Mr Jaffray to be an impressive witness who readily indicated when matters he was asked to speak about were outwith his expertise (see for example page 40 – 24/8/05 and page 64 - 24/8/05 in relation to septic shock, or page 111 – 24/8/05 in relation to pathology). He took his responsibilities to the court in giving expert evidence seriously.

[137] Mr Jaffray had been engaged by the representatives of Doctors Clarke and Anderson to prepare a report on Mrs Dalziel's case with particular reference to the significance, if any, on the ultimate outcome of the failure by the Lerwick Doctors Practice to take action with respect to the laboratory results from 27th October 2002 showing, as they did, an elevated ESR. In summary, he considered it highly probable that this delay had no influence on subsequent events given Mrs Dalziel's clinical state on 22nd November 2002 when she was admitted from hospital in Lerwick to Aberdeen. From his experience of dealing with patients who have been referred to his department he considered it entirely reasonable for the general practitioners dealing with Mrs Dalziel to

have made a diagnosis of degenerative low back disorder. He thought that the clinical picture in September and October 2002 was not that of a serious pathology. The G.P. records, the clinical note of the 27th October 2002 hospital attendance and the physiotherapy records did not, in his view, depict a serious condition.

[138] Whilst initially instructed by representatives of Doctors Clarke and Anderson, and as such having prepared a report focussed on their actions and potential criticisms thereof at the inquiry, when given evidence Mr Jaffray was not in any way encumbered in his openness by the origin of his instructions. He appeared to be a competent, careful and well qualified surgeon. In his evidence he was able to deal with all issues raised in examination and cross-examination. He clearly took his responsibilities to the Inquiry seriously and had not only prepared well but had carried out additional research specifically for the inquiry to assist in explaining his views. He was, in my view, a good example of the independence of an expert the court is entitled to expect.

[139] It was clear that Mr Jaffray did not consider the deceased, on admission to Aberdeen Royal Infirmary, to have been a patient who either did need to be or was in fact treated as an emergency case. As an expert, his thoughtful and considered views of this lady's condition contrasted starkly with those expressed by Doctor Cochran, the family's general practice 'expert' whose position was that much earlier significant intervention by her doctors was appropriate, given Mrs Dalziel's presentation; and that such would have been likely to have had a positive outcome. Interestingly, as an experienced spinal surgeon, Mr Jaffray was willing to attach significant weight to assessments undertaken by the physiotherapists involved in Mrs Dalziel's care whereas Dr Cochran was somewhat dismissive of their skills and expertise. Indeed, Mr Jaffray suggested that because of their day-to-day involvement in treating back problems, physiotherapists often have a better understanding of these problems than general practitioners do. In his own hospital the first line of referral for patients with such problems, who he may ultimately see, is to a physiotherapist.

[140] I was struck in particular by the commonsense non-dramatic approach Mr Jaffray took in his evidence about Mrs Dalziel's illness. For example, when commenting on the finding on 27th October 2002 (when she attended at the Accident & Emergency department of Gilbert Bain Hospital) that Mrs Dalziel had a mild fever (pyrexia) with a temperature of 37.6 ^{o}C, he suggested that the temperature was of no great significance and indeed his own might have been at that level at the time because he was giving evidence in court. He accepted that the examination carried out by the hospital doctor was very thorough but nothing was found to indicate any major concerns, or indeed to indicate a need for blood samples to be taken.

[141] Mr Jaffray also dealt with the suggestion that whilst the Lerwick Practice doctors were dealing with Mrs Dalziel they should have arranged for an x-ray examination.(This was the position adopted by Dr Cochran the family's expert whose evidence was that this would have led to earlier detection and treatment of the spinal infection). Mr Jaffray did not agree that X-ray examination was indicated at any stage prior to her admission to hospital (in November) and it is noteworthy that when she attended at Gilbert Bain Hospital on 27th October 2002, in considerable pain, no x-ray was arranged. The first x-ray was taken on admission to Gilbert Bain Hospital on 21st November 2002 3 days following the incident when Mrs Dalziel was in the shower and which I am satisfied was a vertebral collapse. Following this x-ray examination what was, at the time, described as an L4 vertebral collapse was discovered. Even at that point, however, the treating physicians did not suspect any underlying infection. Rather they diagnosed a probable metastatic cause.

[142] Mr Jaffray was also able to describe for the inquiry the spinal infection from which Mrs Dalziel was suffering. According to him, tuberculosis apart, spinal infection is very rare in an otherwise healthy adult (such as Mrs Dalziel). He said that invariably it is seen in a vulnerable patient with a decreased resistance to infection. Diabetics, drug addicts, HIV patients, patients on high dose steroids, transplant patients and cancer patients on immunosuppressive drugs, spinal surgery patients and those who have sustained direct injury through a penetrating stab or bullet wound make up the majority of spinal

infections. In the frail elderly it can also spread from elsewhere to the spine through a shared venous network, but such cases are rare. For someone not falling within any of these categories to acquire such an infection is exceptionally rare. Mrs Dalziel did not have any of these common precipitating factors and her contracting this infection is therefore to be considered a rare event.

[143] Mr Jaffray described the subsequent clinical path of spinal infection, once established, as being slow rather than sudden. He noted that referral to a spinal surgeon is routinely, if not always, delayed. In support of this view he referred to an audit of spinal infection patients in Birmingham where the average delay in referral to a spinal unit was 3 months for those patients already in hospital in medical wards. Similar results were found in his own hospital and when he made enquiry in preparation for attending the inquiry Aberdeen hospitals showed a similar pattern. When considering the effect of delay in referral to a spinal specialist it is important to remember this evidence of Mr Jaffray's own experience and the experience of other spinal surgery units. I was invited, on behalf of the family to accept that any delay in treating an infection is likely to have a negative impact on outcome. Mr Jaffray's opinion based on his experience (and illustrated by examples) was that the impact of delay was on the underlying structures of the body rather than reduced chances of recovery from the infection. He explained that with delay patients may begin to experience deformation of the spine as the spine starts to collapse (as happened with Mrs Dalziel). Whilst he accepted that such potential problems suggests a preference for early referral that is not because it is expected that such a patient will die, simply that they may be left with spinal deformation.

[144] Mr Jaffray, in his report, comments on the worryingly normal nature of plain x-rays in cases of spinal infection. By this I understood him to mean that this type of spinal infection is not easily identified from x-rays, particularly in its early stages. The apparently normal appearance where they have been such x-rays, can lead to a failure to diagnose such infection and a misplaced satisfaction that all is normal. Not only can such 'early' x-rays be unhelpful in

not showing any changes, the fact that they appear to be normal or, as might have happened here simply showed degenerative change, could distract a clinician from what the underlying process was. Similarly he suggested blood tests can also be misleading. Clinically, as happened here, the back pain associated with the infection is usually attributed to every-day degenerative disc disease of the type a large proportion of the population suffers from. It is of course known that Mrs Dalziel had had symptoms of this in the past. Where patients present with such symptoms, after a prolonged period of low back pain, further investigations may reveal changes suggestive of infection. However merely because a patient presents with back pain Mr Jaffray did not consider that such tests (x-ray or blood testing) are initially indicated. Once infection is suspected the investigation of choice is an MRI scan (not x-ray) which, if there is a spinal infection, will reveal unmistakeable signs of that infection. Following such diagnosis the next stage is a biopsy under radiological control to obtain a sample from the infection site from which the organism responsible for the infection can be isolated and the correct anti-biotic regime identified. Although infection was not suspected, this process is of course what happened at Aberdeen Royal Infirmary following Mrs Dalziel's admission there (albeit using a CAT scan rather than an MRI). In most cases Mr Jaffray considered that bed rest with antibiotics was then the treatment of choice until bone ankylosis occurs. Deformities in the spine were, he considered, normally irrelevant. Surgery, he suggested, would only be indicated if there was an abscess which was compromising her condition. I heard that in Mrs Dalziel's case a laminectomy was carried out because of the presence of abscess and protrusion into the spinal canal.

[145] Mr Jaffray's opinion was that on first presentation by Mrs Dalziel to Doctor Clarke, on 14th September 2002 it is likely that she was already suffering from a spinal infection. I accept that to have been the position. This original infection was identified as staphylococcus aureus, however, the source or cause of that infection remains unknown.

[146] The progression of the infection was described by this witness thus (page 20 D 24/8/05): the infection does not attack the disc (the vertebral body lying

between adjacent vertebra) rather it goes to the vertebrae on either side of the disc, entering the surfaces immediately adjacent to the disc, where a rich blood supply is to be found. The infection is carried through the blood stream from elsewhere. Because the blood supply to the vertebrae is rich the bacteria are able to flourish and grow slowly. Only towards the end of this process do the bacteria 'wander' into the disc when the end-plates of the vertebrae are broken. He considered that in Mrs Dalziel's case this infective process, her spinal abscess and psoas abscess were each connected and fluid flowed from the psoas through the disc space and into a large space inside the spinal canal (page 108 – 24/8/05) so that once the disc was infected the infection passed to the psoas muscle then back to the spine.

[147] This general description of the process seems to fit well with what is known about the symptoms with which Mrs Dalziel presented. Mr Jaffray was very clear in his view that early in the progress of this disease, even up to late September 2002 any changes in Mrs Dalziel's spine would be likely to have been so subtle (with an X-ray image perhaps only showing some blurring of the end plates) to be unrecognisable not only to most hospital doctors but also to most radiologists. He thought that these changes might have been detectable by someone with his specialist experience, or by a spinal radiologist. That, however, in his view, was pure speculation. There would have been nothing else at that stage to indicate referral to such spinal specialist. By the end of October 2002, when Mrs Dalziel attended at Gilbert Bain Hospital, the changes might have been more noticeable by such a spinal specialist but Mr Jaffray found it impossible to say how likely it was that changes would have become noticeable or if so when that would have occurred.

[148] Setting his general description of the progress of this infection in the context of Mrs Dalziel's case, Mr Jaffray was invited to speculate about the significance of Mrs Dalziel's sudden deterioration on Monday, 18th November 2002. Whilst he accepted that his view was speculative, I considered that he had both the experience and expertise to assist me by offering such an opinion, which was that the end plates of the L3/4 vertebrae having been weakened by

the infection (and with calcium being 'washed out' of the area) eventually broke. There was an increased blood flow to deal with the infection running "like a river" through the vertebrae. This lead to the trabeculae (or as Mr Jaffray put it, the vertebral scaffolding) giving way leading to the bony structure sinking. Essentially this end event was a mechanical process which combined with the infection would have led to the pain Mrs Dalziel clearly experienced when in the shower.

[149] Mr Jaffray did not consider that vertebral collapse to be a significant factor in the progress of the disease. This view was based on his experience that neither he nor a recently retired colleague (with some 20 years experience) had ever dealt with a patient who had died because of a spinal infection. Their patients may have suffered spinal collapse, as Mrs Dalziel did, and they may have been left with kyphosis (or spinal deformity) but they would normally heal with no functional deficit (although if the fracture/kyphosis occurred at higher than the L1 level, there might be problems of function deficit if the spinal cord was compromised). Where, as here, the fracture occurred below L1 (in the lumbar spine) all that was likely to be compromised were the nerves controlling the legs. As Mr Jaffray put it, an odd trapped nerve is "not the end of the world".

[150] Despite Mrs Dalziel having a serious underlying pathology when she was admitted to Aberdeen Royal Infirmary on 22nd November 2002 Mr Jaffray did not consider her to be in danger. She was systemically well as demonstrated in the very detailed clinical notes. Her blood pressure, her pulse and her temperature were normal. She remained systemically well until 16th December 2002.

[151] She had been admitted to Aberdeen Royal Infirmary with a diagnosis of a probable metastatic problem, but nothing that indicated the need for emergency intervention. Mr Jaffray agreed that given Mrs Dalziel's history, the x-ray results from Gilbert Bain hospital and the previous blood test results (of raised ESR and CRP indicating a low grade infection) and given her age, a

metastatic cause was what most doctors would have suspected, as the Lerwick hospital doctors did.

[152] I have already outlined the sequence of events in Aberdeen Royal Infirmary and the steps taken by the physicians dealing with Mrs Dalziel to obtain a biopsy sample from which to identify the agent responsible for the infective process. This was successful and the staphylococcus aureus bacterium was identified. This and the identification of its sensitivity to antibiotics were what Mr Jaffray describes as standard, indeed 'key stone', procedures.

[153] Where, as happened with Mrs Dalziel, surgery is carried out and the underlying infection is dealt with, Mr Jaffray indicated that the two adjoining vertebrae at the area of collapse would fuse or join together to become one. The disc between them would disappear. This process of bony ankylosis cannot occur if there is ongoing infection. Its occurrence is therefore an indicator of success. This process can, however, take a long time. Indeed Mr Jaffray was able to provide an example of one patient of his who had not seen ankylosis one year after surgery. The MRI scan on 16th December confirms that in Mrs Dalziel's case this process had started.

[154] In Mrs Dalziel's case Mr Jaffray also considered whether there might be evidence that tuberculosis infection (TB) was present. This was I understood because of the lack of other obvious explanation for the vertebral infection and the presence of large abscess in the psoas muscle. However, he accepted that the pathologist had looked for evidence of tuberculosis post-mortem and the results of those tests taken along with those obtained in life (this same question having been raised by Professor Gilbert after the initial Aberdeen CAT scan) allowed TB to be excluded from consideration.

[155] Mr Jaffray accepted (page 52 D 24/8/05) that the posterior entry laminectomy operation carried out by Mr Labram was intended to deal with a neurological problem, or perhaps more correctly was an attempt to clear the spinal canal of material that might have caused a neurological problem. From his examination of the notes Mr Jaffray concluded that the surgeon did not find

much material in the spinal cord and extended his approach latterly to find pus anti-latterly. Although Mr Jaffray accepted that he did not have the benefit of the results of all the investigations which had been carried out, his suspicion is that had he been responsible for Mrs Dalziel's care he would not have operated at the time as any neurological problems were not dramatic. Indeed, he provided the inquiry with an example of a patient currently under his care and who was in a very similar position to that of Mrs Dalziel and had not been operated on. That is not to say, however, that he criticised the decision to operate. He accepted the decision to operate as lying within the range of reasonable responses to Mrs Dalziel's condition. I took it from his evidence that he has a normally conservative approach to such cases and his preference is not to intervene unless absolutely necessary. The result of such an approach might have been to expose Mrs Dalziel to more pain but this would have avoided the inevitable dangers associated with any surgical intervention.

[156] His expectation (page 54 – 24/8/05) based on his experience is that the surgery along with the antibiotic treatment (for the gram-positive staphylococcus aureus) should have led to a resolution of Mrs Dalziel's problem. Indeed, her apparent improvement over the three and half weeks following her operation appears to bear out that the 'original' infection was under control. She appeared systemically well and was improving in mobility evidence which was indicative of the problem being under control. Mr Jaffray's view was that had the original infection not been under control then it is highly probable that the disease would have progressed; there would have been further vertebral destruction; more collapse; more pain; and systemically Mrs Dalziel would have appeared unwell. I consider this evidence significant when considering the link between this initial infection (which led to her hospital admission) and the infection which is directly implicated in this lady's death.

[157] However, it is known that despite that apparent improvement in her condition, Mrs Dalziel was, by 17th December 2002, showing signs of deterioration. It is clear from all the evidence that despite significant effort to deal with her deterioration she succumbed to septicaemia. As Mr Jaffray put it, "out of the blue she gets a gram-negative septicaemia". Despite his extensive experience

he considered that it was unlikely that it would ever be possible to determine the source of this second infection; and despite all the evidence led at the inquiry I have to agree. His opinion is that there is no evidence to show that the second infection bore any relation to the original infection. In summary, according to this witness, Mrs Dalziel left hospital in Shetland with gram-positive cocci and acquired gram-negative bacilli in hospital in Aberdeen.

[158] If that is the case, as I accept it to be, then Mrs Dalziel's untimely death cannot be attributed in any direct sense to the original infection. If the cause of death is unconnected with the original infection then it follows that the actions of the doctors in Lerwick, cannot be linked to the death in a way that would justify my making determinations in terms of Section 6 (1)(c) or (d) of the Fatal Accidents and Sudden Deaths Inquiry (Scotland) Act 1976.

[159] As is clear from my summary of the law in relation to expert evidence, I am not bound to accept this witness's evidence. For the reasons I have set out, however, I found it persuasive.

[160] Before leaving the evidence of Mr Jaffray I wish to record his evidence when asked to comment on two further issues related to the cause of death. Firstly he was asked about the opinion expressed by the pathologist, Doctor Edwards, that the source of this second, gram-negative, infection could be the psoas muscle. He considered that unlikely and that if there was any gram-negative process there (for which there was no direct evidence) then that was secondary rather than primary. His view was based on his experience that it would be rare to find two infective processes involved in a spinal infection. As he put it, the 'hospital acquired' infection had entered the body and if it landed up in the psoas muscle, that was possible, but it was not there from Shetland.

[161] Secondly the proposition that Mrs Dalziel's renal failure was due to rhabdomyolysis attributable to the original infection was also put to this witness. He acknowledged that he had never encountered a case of rhabdomyolysis (which, given his wide experience, I considered in itself significant). However, in preparation for his attendance at court, he had

carried out a literature search for any papers showing a link between rhabdomyolysis, spinal infection and discitis. Despite the search having been for any papers since 1951 no medical papers suggesting such a link were found. Additionally, he searched for the hundred most recent papers on rhabdomyolysis. Only one of those disclosed any connection with back problems (and even then that was a muscular problem) and none mentioned of the spine in any way. Further, and in any event, Mr Jaffray reminded the inquiry that rhabdomyolysis is normally associated with massive crush injuries. Despite his lack of exposure to rhabdomyolysis he did have an understanding of the process and had attended lectures given by a doctor with army experience of such injuries. In these a conservative approach to treatment of rhabdomyolysis was recommended. Based on the witness' considerable experience he discounted a link between rhabdomyolysis and the spinal infection saying "we don't see it [rhabdomyolysis] and certainly not in the spine". In his career he had known a number of patients to die from gram-negative septicaemia and renal failure but none from rhabdomyolysis. Unlike other opinions which I heard to the effect that a link between the rhabdomyolysis and the spinal infection could be postulated given the lack of any other explanation, Mr Jaffray's opinion that there was no such link was based both on experience and on research carried out specifically for the enquiry. In my view his opinion therefore carries significant weight.

[162] Accordingly, if I accept Mr Jaffray's evidence, the attendance of Mrs Dalziel at Gilbert Bain Hospital at the end of October 2002 and the way the results of her blood tests were dealt with by the Lerwick Doctors Practice had no material impact upon her death. To illustrate this point Mr Jaffray advised the inquiry of the circumstances of a current patient of his. She was aged 62. She had never been ill but had developed back pain which she had complained of for a year. She was treated by an osteopath, a G.P., and a physiotherapist before being admitted to his care with a spinal abscess impinging on the spinal canal. She was now on antibiotics but the commencement of her treatment by these was delayed for a year during which period she would have had a raised ESR. These circumstances were, of course, very similar to those in Mrs Dalziel's case. In Mr Jaffray's view his patient was doing well despite there

having been no surgical intervention and a delayed commencement of antibiotic treatment.

[163] Mr Jaffray's evidence was that even if Mrs Dalziel had been referred to a consultant in general medicine at an earlier stage than she was, it was unlikely that any diagnosis of vertebral osteomyelitis would have been made before the vertebral collapse occurred (18 November 2002). Despite a delay she was ultimately admitted to hospital shortly after that collapse and received appropriate specialist attention. She acquired an infection whilst in hospital from an unknown source. This gram-negative infection was the cause of her death and the source of that infection remains unknown.

[164] Although Mr Jaffray had never worked in general medical practice, he was aware of their practice, through patients being referred to him. His experience is that if degenerative back pain does not resolve within 3 months a patient is likely to have recurrences throughout their life. A previous history of back pain can therefore mask a more significant underlying cause where, such as here, there appears to have been a recurrence. On consultation a doctor is more likely to diagnose a recurrence than to suspect an underlying infection or the more common metastatic disease. Mrs Dalziel, of course, had a record of back pain in 1981, 1986, 1993 and 1995and this suggests a degenerative process. Mr Jaffray accepted that until the results of the blood tests of 28th October 2002 were available it would have been justifiable for a general practitioner to treat Mrs Dalziel's symptoms as indicating low back pain. Once those results were known he considered it would have been unreasonable for any G.P. to have continued with such a diagnosis. With that knowledge a GP should have been alert to the possibility of a more significant pathology and further investigation would be justified, possibly by referral. In Mrs Dalziel's case that pathology was an underlying infection however that pathology has not been shown to be directly connected with this lady's death.

Doctor David Rubinstein

[165] Doctor Rubinstein was the final witness to give evidence to the inquiry. The advantage for agents was that they were in a position to put to him, for comment, each of the conflicting opinions proffered during the inquiry. He was called as a witness by counsel for the family but, as with Mr Jaffray, I considered that he well understood his obligations of independence and objectivity and I was satisfied that his evidence was not influenced by being led by the family. Moreover, he was the most qualified witness in the field of infectious diseases. His full qualifications are set out in Appendix I. At the time of the inquiry, a fellow of, and director of clinical studies at, Trinity Hall, Cambridge. He is the author of a number of publications including co-author of the 'Infectious Diseases Manual', a standard text book on the subject. His special interests were acute general medicine, in particular emergency, medical admission and infectious diseases.

[166] In both his report (production 11) and his evidence at the inquiry, his view, in summary, was that Mrs Dalziel developed an infection of her lumbar vertebrae and this infection spread latterly to involve the adjacent psoas muscles on both sides. Although Mr Jaffray may not have chosen to intervene surgically, Mr Rubinstein accepted that such intervention was appropriate and that the effects of the infection were correctly treated with surgical drainage (and antibiotics). However he was satisfied that muscle damage had occurred, as indicated by the high levels of circulating creatine kinase on 17th December 2002, and this resulted in acute renal failure (as diagnosed by the Aberdeen Royal Infirmary physician, Doctor Miller). Doctor Rubinstein further indicated in his report, by reference to a publication (Firth J, in the Oxford Text Book of Medicine, 3rd edition, Oxford University Press 2003 which publication he also referred to in evidence) that acute renal failure is often complicated by intercurrent infection and carries a poor prognosis: and that Mrs Dalziel developed a gram-negative septicaemia which resulted in circulating collapse with a dramatic fall in blood pressure and finally systolic cardiac arrest.

[167] In his report he suggested that had the hospital blood sample (from 28th October 2002) results been acted upon by the Lerwick Practice when received by them then it is likely that Mrs Dalziel would have been admitted to hospital

within a short time and the investigations which occurred later would have been set in train 23-24 days earlier. This he considered would have reduced the extent of muscle damage and the chances of Mrs Dalziel developing "acute renal failure from rhabdomyolysis" would have been less and that the subsequent gram-negative septicaemia, the cause of her circulatory collapse and death, would not have occurred.

[168] However, that hypothesis was premised on firstly a general proposition which he thought most physicians would accept namely that the earlier the diagnosis the earlier treatment starts and the less the extent of the muscle damage would have been. Set against Mr Jaffray's considerable experience of dealing with these types of infections, a question has to be raised about the soundness of this conclusion which is, really stated as a general proposition of the type which, in the case of *Dingley v Chief Constable*, Lord Rodger found unhelpful without an exposition of the underlying reasoning. I am satisfied that I should be cautious about simply accepting that general proposition. Secondly, it presumes that there would have been an emergency admission to hospital following upon the receipt of the blood results. That, however, is not borne out by the general import of the evidence of the G.P.s and Mr Jaffray which was that the case would have resulted in an 'urgent' but not an 'emergency' referral to a specialist. Such would have led to Mrs Dalziel being seen around mid November and accordingly would not necessarily have led to earlier diagnosis, because the development of the vertebral collapse led to immediate admission to hospital and early diagnosis before the end of that month. Mr Jaffray's opinion was based not only on his considerable experience of dealing with spinal infection but also the results of surveys carried out at a number of hospitals including in Aberdeen.

[169] Thirdly, I cannot be satisfied on the basis of the evidence led of the cause of the gram-negative infection: only that there is an association between it and the renal failure. I find myself in a similar position to that of Lord Nimmo Smith in *McTear* (supra) in not being prepared to hold the causal link between the death and the original infection to be established on the balance of probabilities.

[170] These reservations are not intended as a criticism of Doctor Rubinstein's evidence. Indeed I found his evidence helpful in coming to conclusions. It may be that a medical practitioner would be happy to act on the basis of the hypothesis put forward. That I cannot simply underlines the necessary difference in approach taken when issues are remitted for judicial determination. Judicial proceedings may not be the most appropriate forum in which to test the merits of conflicting medical or scientific theories or to conduct complex medical or scientific debates. A judicial tribunal, with no independence scientific or medical training, can simply proceed on the evidence laid before it.

[171] Doctor Rubinstein who was tendered to the inquiry as an expert on infectious diseases was candid about the speculative nature of some of his conclusions. For example, in relation to his conclusion that the breakdown of the psoas muscle (rhabdomyolysis) was associated with the original confirmed staphylococcal infection he said, when I sought clarification (at page 164 – 20/2/06): "I am not aware of it occurring with infection. I have never seen it. It must be extremely uncommon if it does occur in association with infection". When I separately asked whether I should accept that there was any evidence that infection can cause rhabdomyolysis he said "… it would have to be speculative indeed, unless one had a different explanation. It doesn't prove it of course". In re-examination by Mr Hayhow, he accepted that he had not carried out any literature search on a link between the rhabdomyolysis and infection and could not dispute an absence of any such literature (effectively leaving Mr Jaffray's evidence of the lack of such literature unchallenged). Again in re-examination (page 163 – 20/2/06) when asked about the drawing of a distinction between rhabdomyolysis caused by crushing injuries and rhabdomyolysis caused by infection he indicated that he could not answer as it (rhabdomyolysis) is not known with infection.

[172] With regard to the delay in diagnosis and then treatment of the (original) gram-negative infection, Doctor Rubinstein's position was that the psoas muscle damage would have begun as soon as the muscle started to become

infected, whenever that was. He declined to be precise about the impact of a particular period of delay and accepted that so little was known about rhabdomyolysis that it would be difficult to draw any conclusions about delay in treatment. As he put it (page 144 – 22/2/06) the question of the association between rhabdomyolysis and vertebral infection cannot be answered "because there just isn't the data available to tell you what it means. In general terms, when you don't have data you rely on general principles but these sometimes turn out not to be correct when the knowledge is available. For that reason, I am not willing to make the leap". This was particularly so, in relation to osteomyelitis because "there hadn't been enough cases to draw a sensible conclusion" (page 145 B – 22/2/06).

[173] Although at times during the inquiry there was some criticism by the family of the Aberdeen Royal Infirmary doctors not diagnosing the second infection (the gram-positive infection) earlier, Doctor Rubinstein's evidence did not support such criticism. He deferred to the doctors who were treating Mrs Dalziel in Aberdeen and who are able to see the patient improving up to the 16th or 17th December 2002. As he put it (page 150 – 20/2/06): "I strongly suspect that most clinicians seeing Mrs Dalziel, if she was free from symptoms and infection [the para-spinal aspirate of 17th December was clear] with no fever, not sweaty, would be tempted to wait but some would not".

[174] For completeness I should record that this witness referred to a 2001study in by McHenry and Others of 253 patients from seven Cleveland (USA) area hospitals (production 40). This study, which acknowledged that difficulties of early diagnosis of vertebral osteomyelitis were well documented (confirming Mr Jaffray's evidence) went on to conclude that time to diagnosis, hospital acquisition of infection and neurological compromise were independent risk factors for adverse outcomes (death or relapse). I did not have the benefit of Mr Jaffray's comments on the study, as it was not put to him, despite this clearly falling within his area of expertise. It would not be correct to say that Doctor Rubinstein either did, or had he been asked, would have been able to adopt these findings. However, it is worth noting, in any event, that the study records that magnetic images (MRI scans) were often obtained late in the

course of infection and did not significantly affect the outcome; and that an optimal outcome required heightened awareness, early diagnosis, prompt identification of pathologies, reversal of complications and prolonged antimicrobial therapy. To quote from the discussion section of the study (at page 1347) "because VO [vertebral osteomyelitis] is an uncommon disease physicians are not accustomed to thinking about the diagnosis; erroneous initial clinical impressions are common. The average reported duration from the onset of symptoms to diagnosis has ranged from six weeks to nearly seven months". If anything, the study simply bolsters the view that the delay in diagnosis that Mrs Dalziel was suffering from this unusual infectious process was not out of the ordinary.

[175] With regard to the cause of Mrs Dalziel's death, Doctor Rubinstein suggested that the sequence of events was that she developed a staphylococcal infection of the lower lumbar vertebrae which then spread latterly to affect the adjacent psoas muscle which then led to a psoas abscess; infection also led to the collapse of the L3 and L4 vertebrae; there could have been a breakdown of the psoas muscle and this rhabdomyolysis would have resulted in the release of enzymes, one of which, creatine kinase, is carried in the blood; this can cause progressive damage to the kidneys which would eventually have become overwhelmed. Initially, Dr. Rubenstein's evidence was that rhabdomyolysis was associated with the first infection of staphylococcal bacteria. However as already noted, as his evidence progressed it was clear that he accepted that there was no literature or prior experience of an accepted link between infection and rhabdomyolysis. Whether it was, therefore, attributable to the infection is a matter in on which I was not ultimately persuaded. As I have indicated Doctor Rubinstein accepted that suggesting such a link was effectively a conclusion by exclusion of other known possibilities. Alongside that original infection however it was clear that the enterobacter infection entered the blood stream and the septicaemia (that is infection in the blood) produced an enormous release of chemicals from the blood cells, some of which chemicals are protective but others are potentially damaging. Their effect on the circulatory system was to make the blood vessels porous with the result that fluid could leak out from the inside of the cell into the surroundings,

thus reducing blood pressure to some degree. By virtue of a mechanism which is not fully understood but appears to be generally accepted by medical experts, the so called 'tone' of the muscles of the blood vessels is also altered allowing them to open up and leak fluid, leading to a further, potentially precipitous, fall in blood pressure followed by circulatory collapse or shock (that is "septic shock"). These events would have caused damage to the kidney function. The kidneys would not be profused that is they would not receive sufficient oxygen to allow them to function. That would damage the kidney cells further. Separately and additionally, according to this witness, the enterobacter infection could cause kidney failure on its own, that is could be a separate cause of damage to the kidneys over and above any caused by rhabdomyolysis. Both would, he expected, have contributed to death, however (page 134 – 22/2/06) Dr Rubenstein's view was that the enterobacter septicaemia was the cause of the circulatory failure that precipitated Mrs Dalziel's death.

[176] Although I have noted that Doctor Rubinstein postulated an increased chance of survival following earlier diagnosis and treatment of the original infection, it is interesting what he said, in the context of the non-diagnosis following the 27th October 2002 blood tests. Whilst he couldn't put any figure on the increased survival rate (for a suggested morbidity of about 10-12% for vertebral osteomyelitis) he did suggest that Mrs Dalziel would have survived if that vertebral osteomyelitis had been identified and immediately treated. I am not satisfied, however, that there was any material before me from which I would be entitled to conclude that identification of the worrying blood results would have led to an <u>immediate</u> identification and treatment of the osteomyelitis.

[177] Insofar as the treatment of Mrs Dalziel after the 22nd November 2002 admission is concerned, my understanding of Dr Rubenstein's evidence was that he accepted that the management of the patient was reasonable, with the proviso that perhaps there was some delay in recognising rising inflammatory markers. However, he doubted whether the outcome would have been any different even if they had been.

[178] In relation to the possible failings by the Lerwick Practice, Dr Rubenstein's evidence was that without knowing the system that operated for dealing with abnormal blood results it would be unfair to criticise them but that he strongly suspected that most general practitioners seeing the 28th October 2002 blood test results in the context of a patient with severe back pain would have investigated further or at least referred the patient. In particular, he accepted that there could be no criticism of the way Mrs Dalziel was dealt with by the G.P.s during the first six weeks of her presentation (that is up to the 27th or 28th October 2002). During the period up to her admission to hospital in November, he accepted that she would have been subject to a slow, progressive infection (consistent with Mr Jaffray's description). It would, he thought, be impossible to say when that would have spread into the psoas muscle. However his position, as I have recorded, was that once muscles started to be destroyed the released enzymes would enter the system, albeit slowly. The more muscle was broken down the more enzymes would enter the system. What he described was a gradual, not a sudden process. A test for creatine kinase would not have been a standard test for the GPs to carry out. The first evidence of such a test being carried out, despite the October attendance at Gilbert Bain Hospital and the November admission there was in Aberdeen Royal Infirmary on 16th or 17th December 2002. Accordingly, Mrs Dalziel had been an in-patient in Aberdeen Royal Infirmary for a period of four weeks and appears to have been recovering from the initial infection before there is any definite evidence of muscle breakdown. The patient's renal function, according to this witness, "went off" very rapidly at or around 17th or 18th December 2002. Whilst he accepted that it was not his area of expertise, Doctor Rubinstein said that his medical training suggested that renal function would be considered abnormal once it dropped below 50% of normal. In this case he thought it likely that there would have been progressive, slow, damage so that whilst some renal-function test results would lie in the normal range with others outwith that range until a critical point was reached after which renal function would be considered abnormal. Had Mrs Dalziel been his patient Dr Rubenstein would, at such a stage, have consulted a nephrologist

colleague upon whose advice he would rely. There was no evidence from such a specialist at the inquiry.

[179] Doctor Rubinstein accepted (page 132 – 22/2/06) that Mrs Dalziel had no pre-disposing factors and was, therefore, extremely unfortunate, at her age, to acquire vertebral osteomyelitis; that she was treated and seen to improve but that a phenomenon had then intervened that had no known association with her initial illness (or at least no previously recognised association). He could not say why, out of all the patients who have suffered from vertebral osteomyelitis, Mrs Dalziel developed rhabdomyolysis. Nor did he know anyone who could answer that question with confidence. Whilst accepting the apparent lack in the medical literature of any link between the osteomyelitis and rhabdomyolysis and his lack of personal experience of such, he felt it would be necessary to postulate another cause for the psoas muscle damage if it was not due to infection. This might indeed be the only case where that association had existed but he could not think of any other explanation. His only personal experience of rhabdomyolysis was diagnosis of it in two men who had lain in the open in a drunken condition for some time. Even then he was not responsible for their treatment. He did, however, (at page 133 – 22/2/06) agree that if the link does exist it is so rare that it is important to be cautious about reaching the conclusion that the staphylococcal infection caused the rhabdomyolysis. Whilst I accept the theoretical possibility, given that there was no scientific basis set up on which to test this hypothesis and no documentation of other such cases, I do not consider that in a fatal accident inquiry I am entitled to reach the conclusion that on the balance of probabilities the one caused the other. That may be the case and, in time, there a link may be demonstrated. With the present state of medical knowledge, however, the link was simply speculation, as the witness accepted.

Professor Fiona Jane Gilbert

[180] The final expert witness whose evidence is relevant to the cause of death I will consider in some detail is Professor Gilbert. In addition to holding the chair of radiology at Aberdeen University, Professor Gilbert also works as a consultant with NHS Grampian at Aberdeen Royal Infirmary. She accordingly brought

to the inquiry a mix of academic and practical expertise. She was not truly 'independent' in the way that Doctors Rubinstein and Hunter, Mr Jaffray and Mr Kent are but she is an impressively qualified witness who gave her evidence with care and authority. Although she was involved in the care of Mrs Dalziel at Aberdeen Royal Infirmary she acted principally as a consultant to those treating her in interpreting radiological results for those physicians who were (albeit she was also responsible for taking the first biopsy sample with the assistance of CAT imaging). The Professor's qualifications are set out in summary form in Appendix I. Her area of expertise is radiology and I found her evidence in relation to the interpretation of the various radiographic images to which the inquiry had access extremely helpful. She, like Doctor Rubinstein, gave evidence on the last day on which evidence was led and thus was able to comment on the opinions expressed by other witnesses.

[181] Professor Gilbert first became involved with Mrs Dalziel on Saturday evening, 23rd November 2002 when what was described as an 'emergency' CT scan was carried out on her lumbar spine. As this was a Saturday, the professor's evidence was that CT scanning and not MRI was available as a routine 'emergency service'. The fact that this first imaging procedure at Aberdeen Royal Infirmary is recorded as an emergency CT procedure does not in any way conflict with views expressed, for example, by Mr Jaffray that, on admission to Aberdeen Royal Infirmary Mrs Dalziel's condition was not such that she required to be treated as an emergency. MRI, although the technique of choice for detecting vertebral osteomyelitis (which of course until the scans were carried out the clinicians did not know they were dealing with) is only available at the weekend, even in Aberdeen, for exceptional cases (such as where cord compression has been diagnosed). This appears to be associated with the difficulty involved in assembling the full team necessary for this specialist investigation on a call out basis. As the clinicians were treating a patient with a suspected metastasis, even if she had been admitted during the week (rather than at the weekend) the scan chosen would have been a CT scan. Because of the huge pressure on the MRI scanner (which was said to have a waiting list of six months or thereby) a CT scan was the effective

technique of choice. If the suspicion had been discitis or spinal infection then Professor Gilbert accepted that an MRI would have been carried out and Mrs Dalziel would have been "fitted in". The images from Mrs Dalziel's CT scan showed such clear changes that a diagnosis was able to be made without resort to MRI.

[182] The written report on that CAT scan was prepared by Professor Gilbert sometime after 23rd November but the results were reported to clinicians there and then and microbiology was requested. The plain x-rays (from Shetland) had disclosed a loss of disc space at the L3 / L4 level with a wedge shaped collapse of these two vertebral bodies. The CAT scan showed similar results with destruction of the vertebral bodies at the L3 and L4 level and calcification and protrusion of the posterior aspect of the vertebral bodies into the spinal canal. This protrusion meant that the canal was reduced to one third its normal diameter. The scan also shows extensive calcification in both psoas muscles anterior to L3 with the right psoas muscle having ill-defined margins and being enlarged. In the light of these findings, Professor Gilbert wished tuberculosis to be excluded as such an infectious cause could have been consistent with such findings (as Mr Jaffray also indicated). As I have already recorded, tests carried out at the Professor's request and post-mortem, on the instructions of the pathologist, found no evidence for tuberculosis. In any event, Professor Gilbert's evidence (at page 51 – 20/2/02) was that classically in spinal tuberculosis the vertebral disc is spared from the infection whereas the vertebrae are destroyed. This was not the position in Mrs Dalziel's case. This provides support for the exclusion of tuberculosis as implicated in the cause of death.

[183] These findings were suggestive of vertebral infection rather than the metastatic cause suspected by the clinicians at Gilbert Bain Hospital. As I have already recorded, Professor Gilbert then liaised with other medical staff, Mr Labram attended and a bone biopsy was carried out by the professor using the CT scan to direct the biopsy needle. A biopsy sample from the area between the L3 and L4 vertebral bodies produced material which was analysed by the

microbiology laboratory and the staphylococcal aureus bacillus responsible for the infection and its sensitivity to antibiotics was revealed.

[184] Professor Gilbert was again involved with Mrs Dalziel's case on 19 December 2002 when she assisted Doctor Miller (in whose care Mrs Dalziel now was) to review the existing radiology as part of his search for an explanation for the deterioration in Mrs Dalziel's general condition and her renal failure. This review included all the available radiology images including those taken subsequent to the emergency CT scan. Since then there had been an MRI scan (on 16th December) and another CT scan (on 18th December). When once again reviewing these images in evidence at the Inquiry, Professor Gilbert was able to illustrate her evidence and demonstrate the different images produced by the three techniques (plain x-ray; CT scan; and MRI). I have summarised these in the glossary of medical terms (Appendix II).

[185] Professor Gilbert was invited to express an opinion as to when, over the length of Mrs Dalziel's illness, changes indicating a significant pathology might have been noticed on plain x-ray images. Her position was clearly stated (page 48 – 20/2/06) when cross-examined by Mr Hayhow thus: "I think its very difficult to say at what point you would see changes on an x-ray and at what point you wouldn't … by the time she was admitted [to ARI] there was considerable destruction and so you could speculate that you might [my emphasis] have seen changes in advance of the x-ray [taken at Gilbert Bain Hospital following her admission on 21st November 2002]". Early changes associated with infection of a disc were said by the professor to be extremely difficult to pick up on plain (x-ray) film, confirming Mr Jaffray's evidence. When asked specifically whether it would have been possible to pick up the changes before about 27th or 28th October her position was that she didn't think you could say one way or the other. Moreover, simply looking at the CT images she felt it impossible to say how long a history the infective process had had. When pressed on the point she suggested (page 53 – 20/2/06) that certainly a few days, perhaps up to one week before the first CT scan was taken (24th November 2002) x-ray images or a CT scan might have demonstrated Mrs Dalziel's condition. If that is so then that would suggest the earliest date for

such a demonstration of the underlying condition being the day prior to the date on which I have concluded that Mrs Dalziel suffered her vertebral collapse (18 November 2002) and 2 days after she was last seen at the Lerwick Doctors Practice prior to that event (that is on 15 November 2002 by Dr Krusche).

[186] Although, understandably, Professor Gilbert did not proffer any view on the cause of Mrs Dalziel's death, she did summarise the progression of her condition in a way which coincides, in general terms, with the evidence of Mr Jaffray and Doctor Rubinstein. Where there are dissimilarities I have tended to prefer their opinions as spinal and infections specialists respectively. Professor Gilbert did suggest that the psoas muscle might have been the continuing source of infection despite an apparently sterile aspirate following the laminectomy. This is not the position adopted by either Mr Jaffray or Doctor Rubinstein. Professor Gilbert described Mrs Dalziel as a patient with a proven infection probably starting in her disc and then spreading to her soft tissues where it localised in the psoas muscles. (I preferred Mr Jaffray's description of the infection being carried in the blood to the vertebrae then the disc). She accepted that the patient was treated and was getting better. There was, she thought, some evidence from the imaging to support the view that the soft tissue collection (indicating an infection) was declining and that the collections were becoming more organised and 'walled off'. That is a sign of infection being effectively treated. However, despite that evidence she was aware that from a position of apparent improvement, Mrs Dalziel became more unwell. Professor Gilbert agreed that test results showed the incidence of significant muscle destruction. Doctor Miller had been attempting to find an explanation for that, but he was unable to do so prior to her death. It was against this background that the professor suggested that the psoas muscle might have been what she described as the continued source of infection, notwithstanding the failure of any samples to confirm this. The failure to obtain a positive sample may, the professor suggested, have been attributable to the antibiotic regime as such can, she suggested, distort analysis. The inquiry heard no evidence from a microbiologist as to whether such an explanation was likely and there was no clear evidence linking the second

identified infection with the psoas muscle. Indeed there is no clear evidence from any quarter as to what the source of the second (and according to the pathologist) fatal infection was.

[187] Other than the pathologist, these three witnesses were in my view the most qualified of the experts available to assist me in understanding the sequence of events leading to this lady's death. However Mr Kent, whose evidence was taken midway through the inquiry (on 21st November 2005) was instructed by the Crown to comment on issues as regards Mrs. Dalziel's treatment by doctors in Lerwick and at Aberdeen Royal Infirmary but also gave evidence relevant to the causation of death. Other expert witnesses gave detailed evidence about the actions of the Lerwick Doctors Practice but I intend to refer to them only briefly because ultimately my determination is restricted in its extent because of my conclusions as to the cause of death and the lack of any clear link between the infection and pneumonia implicate in that and the initial spinal infection.

Evidence of Mr Andrew Kent

[188] Mr Kent, commented generally on the treatment of Mrs Dalziel at Aberdeen Royal Infirmary and also by the general practitioners (in Lerwick). He also gave evidence relevant to the cause of death. He is a consultant in trauma and orthopaedic surgery at Raigmore Hospital, Inverness. He is less qualified than some of the other witnesses (see appendix II) having been a consultant since 2002. He has no experience of working in general practice, renal surgery or neurosurgery. He made these limitations in his expertise clear both in his reports and in his evidence to the inquiry. Moreover, he deferred to the pathologist in relation to death causation (page 43 – 21/11/05). His primary interests are in spinal and trauma surgery. As such he deals with patients who are referred for investigation into spinal problems, which are mostly of a degenerative nature or involve mechanical difficulties. Patients with mechanical collapse may require referred to specialists in Glasgow although non-surgical treatment of spinal infection (of the sort described by Mr Jaffray) would come under his remit.

[189] In relation to the actions of the doctors prior to admission to Aberdeen Royal Infirmary (that is prior to the occurrence of the vertebral collapse) Mr Kent made the following points in his reports (strictly a report and a supplementary letter, respectively productions 4 & 5).

[190] Acute mechanical back pain is a very common complaint in general practice and only rarely is there a sinister underlying pathology. There are symptoms, described as "red flags" which would raise one's suspicion of underlying serious pathology but it appears from the G.P. and physiotherapy records for Mrs Dalziel that there was no suspicion of such. The physiotherapy assessment carried out on 14th October 2002, following Mrs Dalziel's accelerated referral, documented a significant history of back pain that had resolved with out-patient physiotherapy. In general terms in patients, who have recurrent mechanical back pain which has responded previously to treatment such as physiotherapy, a doctor treating a similar presentation would suspect a similar primary diagnosis that is of recurring low back pain. A mechanical disc problem is much more common than a disc infection. Mr Kent considered that not only a general practitioner but even a specialist such as himself would have dealt with Mrs Dalziel on the basis that this was a recurrence of her old problems. Even if the case had been referred to him, in the absence of further negative indicators, he would possibly have considered it appropriate to refer Mrs Dalziel for physiotherapy in the first instance.

[191] With a working diagnosis of mechanical back pain, apparently associated with degenerative disc disease and without any red flags (as indicated in the Royal College of General Practitioners Guidelines), it was appropriate to treat the symptoms, that is the pain. In particular, there was nothing to indicate the appropriateness of an x-ray examination. When Mrs Dalziel presented at hospital on 27th October 2002, even with the recorded mild pyrexia and anaemia he would not have expected a casualty officer or general practitioner to immediately consider discitis. He did however consider that it would have been appropriate to request further investigations. This he thought was the first time that there were signs of systemic illness. Mrs Dalziel did attend at her doctors' practice following this hospital attendance. The fully documented

examination by Doctor Anderson on 29th October 2002 did not highlight any significant abnormal findings. Without the blood test results there was nothing to indicate a need to refer Mrs Dalziel for further investigations urgently. The blood test results were indicative only of what he described as a 'low-grade' infection which was 'grumbling' and not immediately life-threatening. He accepted that it was difficult for him to exclude the possibility of hindsight playing a role in his views and there may even have been no real indication to refer Mrs Dalziel at all. However, taken with the blood results Mr Kent considered that an 'urgent' (that is neither an emergency nor a routine) referral would have been appropriate.

[192] Had the blood test results sent to the Lerwick practice following Mrs Dalziel's acute presentation at the Gilbert Bain Hospital Accident & Emergency Department on 27th October 2002 been acted upon urgently Mr Kent suggested that it was likely that Mrs Dalziel would have been admitted to hospital for further investigation and a diagnosis of infective discitis would have been made significantly earlier. He was unable to offer any opinion as to whether such delay as he considers did occur led directly to the death from systemic sepsis and multi-organ failure on the 22nd December 2002. In his report he puts it thus: the delay in diagnosis may have contributed to the initial presentation (that is the vertebral collapse) but certainly did not lead directly to Mrs Dalziel's death. There were, he said, too many steps along the path between the delay in diagnosis and Mrs Dalziel's death from a gram-negative septicaemia to say that there was such a link.

[193] He agreed with Mr Jaffray's comments that spinal infection in an otherwise healthy adult is very rare: that Mrs Dalziel was such a healthy adult; and that referral to a spinal surgeon (for persons suffering from discitis) is normally delayed. Just as Mr Jaffray had, Mr Kent had experience of patient's referrals being delayed even when they had already been admitted to hospital.

[194] Mr Kent was unable to comment on what an x-ray taken shortly after 27th October 2002 would have shown, although he accepted that it may have shown radiographic features of her previous (degenerative) condition and also

subtle findings associated with the vertebral infection. I have already commented on Professor Gilbert's reluctance to be drawn on when any changes associated with the vertebral infection might have been detected on plain x-ray. However, more importantly, Mr Kent considered that carrying out an x-ray examination would not have been an appropriate investigation at that stage.

[195] He was also of the view that with the neurological compromise identified on Mrs Dalziel's admission to Aberdeen Royal Infirmary a combined surgical and medical approach (such as was adopted) was justified.

[196] Although it was suggested to me that the Royal College Guidelines on the management of acute low back pain, even in the absence of red flags, suggest that the non-resolution of such conditions within six weeks would normally lead to further investigation, I am not persuaded that they do in fact do more than caution against the use of x-ray examination before that 6 week period has expired (see my comments in Appendix II – the glossary). In fairness Dr Krusche did accept that by that stage he would normally have considered specialist referral or further investigation. These are guidelines only and are not intended to set rigid timetables or to replace clinical judgment. Mr Kent did not consider that there was anything untoward about non-referral of Mrs Dalziel at exactly six weeks and even a further two weeks delay in referral(let alone in being seen by a specialist) was considered acceptable particularly in a lady who was otherwise healthy and had a previous recorded history of low back pain which resolved, bearing in mind also that both her general practitioner and physiotherapy records disclose that her symptoms were not constant, tending to wax and wane over time.

[197] It was clear from Mr Kent's evidence that if every patient who presented at a doctor's surgery with symptoms of low back pain was to be fully investigated with all the available techniques resources would be swamped.

[198] Mr Kent also wondered whether the fact that Mrs Dalziel was seen over the period from September to November 2002 by 4 different doctors might have

had an influence on the diagnosis of her condition. Rather than relying upon another doctor's notes, where there is continuity of consultant, there is no need to reconstruct what the previous doctor is attempting to describe in his or her notes. The doctor is then perhaps in a better position to put in context any changes in the patient's condition. I am not satisfied that this is a matter on which I can make any determination as there was insufficient evidence before me at the inquiry to conclude that the only reasonable system for dealing with a patient who presents with low back pain is for that patient always to be seen by the same doctor. I do accept as a matter of commonsense that where patients are, or potentially may be, seen by more than one doctor a greater significance attaches to the completeness and accuracy of the note made of a consultation, to allow the next consulting doctor to be able to put that consultation in an appropriate context.

[199] Much had been made, at the inquiry of the fact that when Mrs Dalziel was seen at Gilbert Bain Hospital Accident & Emergency Department, at the end of October 2002, the senior house officer arranged for blood samples to be taken. The suggestion as I understood it was that if he considered it necessary to take such samples then the general practitioners dealing with her previously should have done so. Of course we did not have the advantage of hearing from this witness why he considered it was necessary to take such samples. Other experienced witnesses considered that Mrs Dalziel's presentation did not indicate such a need. Mr Kent's agreed that there was no clear indication from that doctor's record why he had decided to take those blood samples and nothing in that record to indicate a need to take them. Mr Kent speculated that the doctor may simply "have had a gut feeling". Alternatively he may have considered that as a positive way to end the consultation, that is the doctor was aware that blood testing was not called for given Mrs Dalziel's symptoms but taking the samples may have provided her with some reassurance that something further was being done to investigate the cause of her symptoms, rather than simply being provided with relief from the symptoms. The fact that these tests were carried out and indicated a low-grade infectious process took on a significance for a time at the inquiry but I am now satisfied that they remain relevant only in the context of why the results were not acted upon

once received at the Lerwick Practice and as confirmation of the disease process, that it that they provide some support for the existence of a low grade infection around 3 weeks prior to Mrs Dalziel's vertebral collapse. The fact that they were taken by a senior house officer in Accident & Emergency at 0100 hours does not that all reasonably competent doctors in that situation either should or would have taken such samples. Nor does it imply anything, that the general practitioners dealing with Mrs Dalziel beforehand should have done so.

[200] Had the blood test results been acted upon as soon as they were received at the Lerwick Doctor's Practice, the witness suggested that x-rays may then have been called for, not so much as a diagnostic tool but more to provide a base line for future comparison.

[201] This witness did agree with Mr Hayhow that generally speaking the earlier infection is treated effectively, the better the chance of a positive outcome for the patient. However, as he put it (page 66 – 21/11/05), delay in diagnosis did not lead directly to Mrs Dalziel's death. To an extent he accepted that if she hadn't had the first infection she wouldn't have she would not have been in Aberdeen Royal Infirmary and would not have acquired the second infection died. That may be correct but even had the blood results been acted on earlier it still seems likely that she would have found herself in Aberdeen Royal Infirmary (possibly only a few days earlier at best) and as it is not known what the source of the second infection was it seems equally possible she might have acquired it. There was certainly no evidence to suggest she would not have. The sequence of events is rather more circuitous than the simple scenario suggested by saying that had her condition been identified earlier she would or might have survived. As with other witnesses, Mr Kent accepted that following her initial treatment at Aberdeen Royal Infirmary she seemed to be making a good recovery when there was a sudden deterioration (some three weeks after the surgery). He concluded that there was no direct link between that and the first infection. Having been asked by Mr Hayhow, for the family, to express a view on this, Mr Kent accept that the expression of an opinion

about the possibility (and nature) of any causal link between the initial infection and the death was somewhat beyond his expertise.

The Crown Submissions as to cause of death.

[202] Having considered the pathologist's evidence along with the other evidence led from experts in relation to the progress of Mrs Dalziel's illness, the procurator fiscal depute invited me only to find that Mrs Dalziel died from gram-negative septicaemia. He accepted that the independent expert evidence I have outlined raised significant doubt about the relationship between that septicaemia and the original infection (which led to Mrs Dalziel's admission to hospital). Given the various opinions offered regarding the source of the gram-negative enterobacter aerogenes infection he submitted that I would not be entitled to conclude what the source or cause of that was. The evidence at the inquiry had not, he submitted, sufficiently established any other morbid condition giving rise to the gram-negative septicaemia.

For the family

[203] As I understood his submissions, counsel for the family invited me to conclude that the gram-negative infection of the enterobacter aerogenes bacterium (for which he accepted there were several possible causes) caused the septicaemia which contributed to the onset of multi-organ failure. That multi-organ failure had, in his submission, been caused primarily by rhabdomyolysis which was the result of an abscess in the right psoas muscle to which a staphylococcal infection (by a gram-positive bacteria) had spread bilaterally from a site in the L3/4 intervertebral disc and the adjacent vertebrae; and which staphylococcal infection had been contracted some time before 14th September 2002.

Grampian Health Board

[204] Mr Mackenzie, counsel for Grampian Health Board, accepted that the question of the cause or causes of Mrs Dalziel's death did not have an easy answer. He accepted that there was no dispute that Mrs Dalziel died from multi-organ failure and that this seemed to be caused by a combination of septicaemia and rhabdomyolysis but that it was less clear to what extent the gram-positive (staphylococcal) and gram-negative (enterobacter) bacteria caused or contributed to

those conditions. He speculated that the most plausible explanation for the presence of gram-negative infection is that it was a result of rather than a cause of multi-organ failure (given that it is a bowel based infection and was not cultured until shortly before Mrs Dalziel's death).

For Doctors Anderson and Clarke

[205] On behalf of Doctors Anderson and Clarke, Mr Holmes submitted that I should conclude that Mrs Dalziel died from multi-organ failure having developed rhabdomyolysis and in the presence of gram-negative septicaemia. He submitted that it had not been established which of those conditions developed first and whether there was any association between them. Nor, he submitted, had it been established that the gram-negative septicaemia or rhabdomyolysis were caused by or had any association with the para-spinal abscess from which it was accepted that Mrs Dalziel had suffered and which was found to be gram-positive.

For Dr Murphy and Dr. Krusche

[206] Mr Stewart considered that seldom at a fatal accident inquiry had the evidence concerning the cause of death presented such difficulties. He suggested that there were almost as many different views about the chronology of events as there were witnesses on the subject. That, he suggested, indicated that particular caution should be exercised by me in reaching a view on the cause of death. He agreed that it was not in dispute that Mrs Dalziel died from multi-organ failure. He suggested her organs were finally overwhelmed by her body's reaction to the gram-negative septicaemia (enterobacter aerogenes) and that, he suggested, was a view shared by all the experts. He submitted that where the difficulty arose was decerning the reason for those bacteria flourishing. He suggested that no single expert could be regarded as authoritative in respect of the overall analysis of Mrs Dalziel's condition. For example Mr Jaffray might be considered authoritative in relation to the diagnosis and treatment of spinal infections but had himself freely conceded that rhabdomyolysis was not a condition he could offer much guidance on. The intensive care experts could speak to the likely development of multi-organ failure and the treatment of sepsis but had little to say about rhabdomyolysis. As I understood his submissions he invited me not to take a view about the sequence of post-operative events leading to Mrs Dalziel's death as distinct from the immediate

cause of death but suggested that if I did, Mr Jaffray and Dr. Rubenstein had most fully described what was happening in the final three weeks of Mrs Dalziel's life; that Mr Jaffray's analysis of why the spinal infection had been controlled was convincing; and that Dr. Rubenstein was the only witness on the topic of the subsequent deterioration who attempted to describe it in terms of the development of rhabdomyolysis.

Discussion about the cause of death

[207] The determination of the cause of death in all such inquiries is clearly important. It is a primary function of the presiding Sheriff in terms of the Fatal Accidents and Sudden Deaths Inquiry (Scotland) Act 1976, section 6. Although at the business meeting preceding the Inquiry there was no hint that it would become such an issue, in my view it is the issue that dominated the inquiry and has dominated my consideration of the evidence. In the end it became more important than assessing the critical and defensive evidence led from Doctors Cochran, Thornton and Rutherford and the 4 Lerwick general practitioners who dealt with Mrs Dalziel. My decision about the cause of death has a crucial significance for what I am entitled to determine about the actings of the doctors who dealt with Mrs Dalziel. As it is my decision on the cause of death limits the relevance of criticisms of the general practitioners and accordingly consideration of the evidence about the cause of death is the focus of this written determination.

[208] As I have already indicated, given the other evidence available, I am not prepared to accept the evidence of the pathologist, Dr Edwards, in its entirety. I am prepared to accept slightly more than suggested by the procurator fiscal depute. As I have set out in my discussion of her evidence, when I take into account the evidence of the other experts, I have reservations about the way she describes a link between Mrs Dalziel's initial gram – positive infection and the gram-negative septicaemia which was directly implicated in her death. I have set out those reservations, and my reservations about aspects of each of the other expert's evidence as I discussed it. I consider that Mr Stewart is correct when he says that none of the witnesses commenting on the cause of

death could be considered to be the ultimate authority. As I hope I have made clear I found persuasive elements in the evidence of each of the witnesses, Dr Edwards, Mr Jaffray, Dr Rubinstein, Professor Gilbert Dr Hunter and Mr Kent, although only Dr Edwards spoke about the candida pneumonia. However there is really little, if any, doubt that the proximate cause of Mrs Dalziel's death was the septicaemia caused by the (gram-negative) enterobacter aerogenes infection but, in terms of Dr Edward's clear evidence candida pneumonia also played a significant role. There is no evidence that she was suffering from either of these on admission to Aberdeen Royal Infirmary. Enterobacter aerogenes is found in the lower intestine and is normally harmless whilst there. The candida pneumonia has a fungal origin. Although there were a number of theories presented to me as to possible causes of the enterobacter infection, I heard no evidence that satisfied me on the balance of probabilities as to the source or cause of that or the candida pneumonia. In particular I was not satisfied that the link between this second infection and the first was anything more than a theoretical possibility and certainly not sufficiently proven or proximate for me to accept the link established. Nor did I hear any evidence on which I could link the two conditions implicated in the cause of death to any lack of care in Aberdeen Royal Infirmary. Accordingly I will restrict my determination as to the cause of death to the gram-negative septicaemia and candida pneumonia.

5. ISSUES RAISED ABOUT MRS DALZIEL'S MEDICAL TREATMENT

[209] A number of issues were raised about Mrs Dalziel's treatment by doctors primarily the general practitioners in Lerwick against whom the criticism was laid that they had not acted with sufficient diligence in their treatment of Mrs Dalziel; had not heeded her and Mr Dalziel's concerns and requests for x-ray examination; had failed to appreciate that her condition was worsening; had failed to follow the guidance of the Royal College of General Practitioners in relation to the treatment of back pain; and had failed to properly deal with the results of blood tests taken at Gilbert Bain Hospital on 27/28 October 2002. There were also some questions raised about the Aberdeen Royal Infirmary doctors, in particular suggestions that they failed to detect the second infection and the development of her renal failure early enough and that the surgeon had not used the most appropriate surgical technique. With the exception of the criticism of the Lerwick practice for the way it dealt with the blood results I do not consider any of these criticisms justified. Moreover I am not satisfied that I can link and failures to the proximate causes of death in a way that would allow me to reflect them in my determination.

[210] I have already commented on a number of the relevant points in the context of my commentary on the evidence of the witnesses whose evidence I considered most relevant to the cause of death, but whose evidence was not limited to that topic. I will now set out the other relevant evidence under the following headings: The evidence of the deceased's family; the Independent Medical Evidence; the evidence of the witnesses from the Lerwick Doctors Group Practice; the Organisation of Lerwick Doctors Group Practice; and Medical records and Mrs Dalziel's test results

The evidence of the deceased's family

[211] Evidence was led from Mr Dalziel, Mrs Dalziel's husband, and also from their son and daughter, Ross and Lyn. Mr Dalziel's evidence took a significant time

commencing as it did on 15th August 2005 and not concluding until 16th August 2005. The evidence of Ross Dalziel and Lyn Dalziel was dealt with in shorter compass. Unless otherwise indicated, any reference by me to Mr Dalziel this determination is (and has been) a reference to Mrs Dalziel's husband, rather than her son.

[212] Mr Dalziel (senior) came across was a quiet and dignified witness. During cross-examination by Mr Holmes, on behalf of two of the general practitioners, I started to have about his recollection and when his evidence is set against that of his children and the general practitioners who dealt with Mrs Dalziel, I conclude that he is not an entirely reliable historian as far as the progression of his wife's illness is concerned. He was at somewhat of a disadvantage in that he was asked to cast his mind back almost three years to the incidents leading up to the tragic death of his wife without reference to any notes or productions. There is no question in my mind that Mr Dalziel was attempting to deceive in any of the evidence he gave. I am sure that he is satisfied in his own mind that his recollection of incidents is correct. However in many respects I am not satisfied that it is.

[213] Mr Dalziel attended with his wife on most, but not all occasions she consulted a doctor. His evidence as to the nature and extent of the consultations between his wife and the various doctors and his evidence as to any improvement or deterioration in her condition could have been of significance as in many respects it contradicted the evidence given by the doctors. Moreover it seemed to me that much of the evidence of Dr Cochran was premised on the acceptance of Mr Dalziel's interpretation of the actions of the general practitioners. However I could not rely on his recollection, unaided as it was by any contemporaneous record. For example he disputed that his wife's condition ever seemed to improve, as contended by the general practitioners. He described her condition as being on a constant downward progression. Whilst in general terms his children agreed that over the piece Mrs Dalziel's condition was not improving at all, Lyn Dalziel accepted in her evidence that her mother may have reported to doctors a slight improvement (even though that was not the case, but because she was not a lady who complained or liked

to make a fuss). Irrespective of the progression of the underlying infection it is clear to me that Mrs Dalziel was reporting to both general practitioners and the physiotherapist some improvement. I do not believe that the records to this effect are false.

[214] Mr Dalziel was adamant about the fact that Doctor Clarke, at the first consultation (on 14 September 2002) did not demonstrate any exercises to his wife; and that his wife had not been carrying out any such exercises thereafter. However, Ross Dalziel, who resided with his parents, spoke to his mother carrying out stretching exercises.

[215] Not only were the family members, and in particular Mr Dalziel, at some disadvantage in not having any contemporaneous notes to refer to I suspect that their view is influenced by the distress that they must have suffered following Mrs Dalziel's death and that some of their evidence is distorted by hindsight particularly of because of what they later found out had been happening as far as the progression of the underlying illness is concerned and also by the disclosure to the family (initially by the practice itself) of their failure to properly deal with the blood test results. I accordingly consider that the evidence of the family witnesses is of limited assistance in the understanding the development of Mrs Dalziel's condition.

The Witnesses from Lerwick Doctors Group Practice

[216] Four general practitioners from the Lerwick doctors' practice gave evidence as did Mr Carle, the practice manager at the relevant time. Of the witnesses from the Lerwick practice who gave evidence, Mr Carle was one whose evidence I had least confidence in. I excluded from my consideration the fact that he was clearly nervous and his mannerisms when speaking about matters about which he felt strongly. It is fair, however, to record that he had something of a 'bee in his bonnet' about staffing levels, amongst support staff, at the practice particularly in 2001, yet I could not see how, on any view, that issue was relevant for this inquiry. The very point on which one might have expected him to have provided most assistance to the inquiry (why the laboratory results

for Mrs Dalziel were filed without any action being taken by Doctor Murphy to whom they had been directed) was one he was at a loss to explain. Giving due allowance for his absence from the practice since his retrial earlier that year, his responses to questions were often not particularly helpful and I informed an impression that he was not completely in command of the administrative procedures at the practice at the time I was interested in. Partly this may have been attributable to the lack of structure to the management systems and in particular his relationship with the general practitioners.

Dr Gillian Clarke

[217] Doctor Clarke was the first of the general practitioners to give evidence. I was generally impressed with her evidence. She was confident and presented as a caring individual who was interested in doing her best for her patients. She was, I felt, slightly defensive of the practice and of her own clinical judgment and I had some concerns that she failed carry out any follow-up to check what was happening with the laboratory results on Mrs Dalziel's blood tests even though she was telephoned by the senior house officer from the hospital, trusting instead that something would be done. There was no record made by her of that telephone call. Those are, in the event, minor reservations. She was, in my view, patently honest in her evidence about the consultation with Mrs Dalziel on the 14th September 2002 and I prefer her recollection (which is entirely consistent with the medical records) to that of Mr Dalziel. In particular, I noted that she was genuinely aghast at the suggestion, which was put to her, based on Mr Dalziel's apparent recollection, that she had carried out the consultation sitting behind a desk, that is with a desk placed between her and the patient. That was simply not consistent with her general practice, the set up of the consulting room with the doctor's desk placed against a wall so that the doctor sat side on to the patient, let alone the unusual circumstances of Mrs Dalziel's attendance with her difficulty in walking and need to stand.

Dr Martin Krusche

[218] Doctor Krusche gave evidence early in the inquiry, albeit after we had heard from Doctor Clarke. In assessing Doctor Krusche's evidence I am conscious that English is not his first language (he graduated in Germany). Although in

submissions there was some criticism of him and the way in which he gave evidence, I considered that was largely unwarranted. I consider that he was thoughtful in his responses and, as I would expect from a professional witness, was not dogmatic. Indeed in evidence he altered his initial stance that the only criticism of him which was justified was his somewhat limited note taking on the 15th November 2002, to an acceptance that a reasonably competent general practitioner being presented with a patient with unresolved back pain after eight weeks should have done something, albeit tempered by the explanation that he was expecting to see Mrs Dalziel again the following week. He accepted in retrospect that he could have considered an orthopaedic referral.

[219] I was of the view that when Doctor Krusche saw Mrs Dalziel on 7th November 2002 (when she sought excusal from jury duty) and when he next saw her on 15 November 2002, for acupuncture treatment, rather than dealing with the patient and her symptoms he was more focussed on simply dealing with the immediate business which brought her to the surgery.

Doctor Dylan Murphy

[220] Doctor Murphy struck me as a straightforward, well informed professional witness who dealt with questions put to him in examination and cross-examination in a reasonable and considered way. He was not dogmatic and I had no reason to doubt that he was telling the truth when he said that Mrs Dalziel's medical records and the blood results with Dr Clarke's instruction "not my patient. Didn't take blood. To Dylan" had not reached him as intended.

Doctor Yvonne Anderson

[221] This inquiry was much delayed because Doctor Anderson was considered a crucial witness but was unable to attend the inquiry because she had undergone surgery and was convalescing thereafter. When she did give evidence she clearly found it a physical ordeal (she required to remain seated). She was quiet and careful in her evidence. She was clearly aware that her consultation with Mrs Dalziel on 29 October 2002 was of considerable interest to the Inquiry and that her performance at that consultation was subject to

criticism. She was tearful at times but on no occasion did I consider she was doing anything other than her best to tell us truthfully and in a straightforward manner what had happened to Mrs Dalziel, a patient who was registered to her and for whom she clearly felt a level of responsibility. She was open, straightforward and entirely believable when she explained why, having discovered the 'un-actioned' blood test results and casualty sheet on 22 November 2002 she wrote "file", something she candidly accepted to have been inappropriate.

The Independent 'Experts' on General Practice

[222] I heard four witnesses who were asked to express opinions on general medical practice and in particular Mrs Dalziel's treatment by the Lerwick doctors. In addition to Dr Hunter, whose evidence was led by the Procurator Fiscal Depute, and whose evidence I have dealt with in the context of the discussion as to the cause of death, three witnesses were called for parties to comment on issues of general medical practice. These were: Doctor David Cochran, called by the family; Doctor Daniel Rutherford, called for doctors Murphy and Krusche; and Doctor Peter Thornton, called for doctors Anderson and Clarke.

[223] Each of these general practice experts is well qualified and each has significant experience as a general practitioner. Their qualifications are set out in detail in Appendix I. Equally, however, the general practitioners from the Lerwick practice who gave evidence are well qualified and have a significant amount of experience. I have considerable sympathy with the submission of Mr Holmes, on behalf of doctors Anderson and Clarke that I should place as much reliance on the expertise and opinions of the Lerwick practice doctors as on those of the independent G.P. experts. To the extent that I feel that I do require assistance from experts to reach conclusions on matters of general medical practice outwith the general experience of a judge of fact, then I am satisfied that I am equally entitled to rely upon the opinion evidence of these general practitioners as I am on the other experts.

[224] I am not satisfied that I require such guidance to assist me in dealing with basic record keeping or administration procedures for dealing with and informing patients of the outcome of test results. I do accept, however, that in relation to the appropriate response to a complaint of lower back pain I am entitled to reply upon the evidence of doctors who have experience in this area. Doctor Thornton was the most experienced of the G.P. witnesses as his entry in Appendix I shows. Doctor Rutherford was also well qualified as can be seen. I do not wish to suggest that these witnesses and Dr Cochran did not provide valuable commentary on the appropriate way for a general practitioner to deal with a lady presenting as Mrs Dalziel did. Rather the value of their evidence has been somewhat overtaken by my conclusions as to the cause of death and the lack of link between that and the earlier infection.

[225] I do however consider it relevant to comment upon the evidence given by Dr Cochran. Where a witness does give evidence as an expert then the court is entitled to expect a level of independence and objectivity in that evidence. I am afraid that insofar as Doctor Cochran is concerned (whose evidence was the most critical of the actions of the general practitioners) I find it difficult to accept that he always showed that level of independence. His report and his evidence appear to have been unduly influenced by views of the family, as to how matters progressed rather than how matters were recorded as having progressed. His criticisms of professional colleagues were neither measured nor expressed in unemotional, objective terms. I was unimpressed by his report (production 9) to the extent that he concludes by expressing an opinion about what the public interest requires and advocating the holding of a Fatal Accident Inquiry. That of course is a decision for the Lord Advocate not for a general practitioner however expert. I am surprised that the witness felt it appropriate to offer such a view on a matter such as this which falls well outwith his are of expertise, even if that was what he was asked for by those instructing the report. I trust that view did not have unduly influence a decision to hold a Fatal Accident Inquiry. The impression I gained was that having formed an adverse view of the actions of the general practitioners in this case ("The clinical care of Gladys Dalziel was negligent") nothing anyone else might say would sway him, despite his being very much on his

own in the extremity of his criticisms of the general practitioners. I was considered that hindsight influenced his views significantly and that he failed to appropriately discount that when viewing the actions of the doctors.

The organisation of the Lerwick Doctors Group Practice

[226] Before dealing with the more significant issue of the failure to deal with the blood test results I will set out in this section a number of the issues about which I heard evidence, including from the witnesses from the practice and the GP experts which might have been relevant to any criticism of the Lerwick doctors. These issues generally related to the way the group of doctors were organised.

(a)The practice.

[227] The G.P. practice with which Mrs Dalziel was registered as a patient is the Lerwick Doctors Group Practice, South Road, Lerwick. Each of the four general practitioners based at this practice and who dealt with Mrs Dalziel's care during her final illness, gave evidence. One doctor who saw her during this period, but whose dealings with her are incidental, was not a member of the practice (he was acting as a locum) and did not give evidence. At the relevant time the doctors based in this practice were organised together as what as known as a Group Practice. There were seven G.P.s involved in this practice but not all worked full-time. For example, Doctor Gillian Clarke, a witness at the inquiry, worked three quarters time and combined this general practice with other commitments such as post graduate tutoring in medical education for Shetland as set out in the Appendix I.

[228] The general practitioners in the practice were self-employed. The arrangement was described by Doctor Clarke as a coalition of G.P.s. There was no senior partner and no formal management structure whether hierarchical or otherwise. There was some uncertainty about management responsibilities amongst the doctors. For example, Doctor Clarke commented (at page 163 – 16/8/05) that she believed that a Doctor Cooper (who left the practice around September or October 2002) had had some responsibility, prior to leaving, for the

management of the practice. Doctor Anderson was said to have taken over later, but not at the time that was of interest at the inquiry. The doctors were not a 'legal partnership' (page 62 – 18/8/05). They provided services to the local Health Board under a national standard contract.

[229] Mr Carle, from whom I heard evidence, was employed by the doctors as full-time practice manager. It was accepted, however, that each of the general practitioners in the group practice had responsibility for the organisation of the practice as a whole.

[230] By the time of the inquiry, the organisation of the practice had altered. As of 1st April 2004, when a new National G.P. Contract Scheme came into force, all the doctors then in that practice became employees of Shetland Health Board which then, as I understood it, took on responsibility for the organisation of the doctors' practice.

(b)The team system for the doctors.

[231] I heard evidence that as in other similar practices, the doctors in the Lerwick Doctors Group Practice operated a team system with 3 teams of 2 doctors. This involved the pairing of two doctors with patients being registered with one or other of the doctors in the team. The advantage was said to be that one member of the team would be able to cover for the other for leave and such like absences. Doctor Murphy was teamed with Doctor Anderson and (although Mr Dalziel and Mrs Dalziel appeared unaware of this) Mrs Dalziel was registered with Doctor Anderson. Although there was considerable evidence on this topic I did not ultimately consider that this, or indeed the number of doctors that Mrs Dalziel saw, was a significant factor in this lady's death. The fact that she and her husband did not appear to be sure who she was formally registered with is, in my view, a side issue. What is relevant is whether, when she saw a doctor, she was treated properly by that doctor. There is no suggestion that because she saw doctors other than members of the team to which she was registered that she was treated any differently than would be a patient registered to that doctor or to an unacceptable standard.

(c) The appointment system.

[232] Mr Carle gave evidence to the inquiry about the systems operated at the Lerwick Doctors Group Practice for fixing appointments; for dealing with incoming blood results; for the filing thereof; and for keeping patient's records. Despite there having been some evidence at the inquiry about the system for appointments I do not consider that any real issue arises in relation to this system and I consider that it is only necessary to record that there were three types of appointment at the Practice – booked appointments, where patients would book an appointment with a specific doctor (these were normally '10 minute appointments'); standby appointments, where patients who could not make an appointment with their doctor of choice could attend the surgery and wait 'to be fitted in'; and thirdly, urgent appointments.

(d) The responsibility for staff.

[233] Mr Carle and the other staff at the Practice were, at the relevant time, employees of the Group Practice that is of all the G.P.s in the practice. Accordingly it was accepted by parties at the inquiry that were I to find that there were defects in systems or reasonable precautions which might have been taken by the doctors or staff at the practice, which would have avoided Mrs Dalziel's death, each of the doctors in the practice at the time bore some responsibility. The purpose of a Fatal Accident Inquiry is not however to attribute blame but rather to determine whether there were any defects in systems or any reasonable precautions which might have avoided the death.

[234] Although by the time he gave evidence he had retired, Mr Carle had been employed in the position of practice manager for some 13½ years before he retired in April 2005. He had no other experience of managing a medical practice. Mr Carle had no direct line manager although he had line management responsibilities for other staff employed in the Practice. He explained the arrangement as each of the doctors in the practice as having considered themselves to be an "equal employer". Accordingly no one individual had a responsibility for the organisation of the Practice.

Medical records and Mrs. Dalziel's blood test results

[235] I heard some evidence at the inquiry about inconsistencies in the way that doctors recorded the type of consultation a patient attended. It is clear that there was not a uniform practice amongst the doctors at the practice for recording these appointments. Interestingly Mr Carle had no knowledge of the way in which these were recorded in the patient's medical records. That being said, I did not consider that any issue in fact arose out of this lack of consistency.

[236] Mr Carle described the system, as he understood it, for dealing with blood results and hospital accident and emergency department attendance records (generally referred to as 'casualty forms') sent to the practice following an attendance by a patient of the practice at the hospital accident and emergency department. I did not hear, either from Mr Carle or any of the doctors, convincing evidence as to how the results relevant to the samples taken from Mrs Dalziel at Gilbert Bain hospital on 27th October 2002 did arrive at the practice. Mr Carle gave evidence that a porter (as I understood it a porter employed by the Health Board) would deliver mail, including such results, to the reception area of the practice. Once within the reception area, practice administrative staff would open envelopes adhibit a stamp and then place results in the appropriate doctor's basket. This 'stamp' was not a date stamp but a pro forma 'action' stamp to assist the doctor in recording that they had seen the document and what was to happen to it. There was evidence from Doctor Clarke about laboratory results being faxed to the practice, but Mr Carle's position (page 70 - 18/8/05) was that laboratory results came by post. When asked about the faxing, or possible electronic transmission of these results, he was unable to assist the court as to when a system of using printers, linked to the laboratory at which the analysis was carried out, commenced and whether the laboratory results which the inquiry was interested in (including those at page 97 (A) of production 1) were in the form submitted by post, electronically or by fax. Recognising that he had been away from the Practice for about 5 months when he gave evidence, I was not impressed by Mr Carle's command of the administrative arrangements for dealing with these important results.

[237] Be that as it may, it was clear that the intention, if not the practice, was that doctors were responsible for emptying baskets of papers once or twice a day depending on whether they were working morning and afternoon or part of the day only. This included any paperwork such as laboratory results that was passed to them. Having considered the report of results they could make use of the pre-stamped option boxes (from the stamp) to indicate to administrative staff what further action was necessary. This could either be by ticking one of the standard option boxes, such as 'file' or by instructing other specific action by writing it out in long hand. The stamps included a series of initials to allow the doctor to indicate who had instructed the action to be taken. It became clear at the inquiry that the stamps used by the practice in autumn 2002 were not kept up-to-date in that on the laboratory results appearing at page 97(A) of production 1, the initials "SL" still appeared. These initials appear to relate to a doctor who had left the Practice some time before. It was also notable that Doctor Clarke's initials were not on the stamp despite her having worked with the practice for a number of years. This did not suggest to me that the practice kept their administration systems up-to-date and under review. Whilst that might properly be seen to be an issue falling within Mr Carle's area of responsibility, each of the doctor's was ultimately responsible for Mr Carle and, in any event, should have been alert to such basic requirements as keeping systems up to date.

[238] Mr Carle's evidence was that some doctors were more diligent than others at filling in pre-stamped instruction forms with some failing to use the pre-stamped form, adhibiting their own note at the bottom of a sheet of paper.

[239] It was also accepted in evidence that the laboratory results were received by the practice on A4 size paper and that, for reasons which were not clarified, prior to filing these results were cut by administrative to a smaller size, sometimes resulting in instruction notes from doctors being "cut off".

[240] With particular reference to laboratory results, it was clear that normally, following receipt, they would be placed directly into a doctor's basket but

without the patient's medical records (notes). If, on seeing these results, the doctor thought it necessary to see the patient's notes before deciding what action to take they could request those notes be recovered by the administrative staff or alternatively recover them personally.

[241] What I accept happened in Mrs Dalziel's case was that Doctor Clarke, having seen the results from the sample taken at Gilbert Bain Hospital, requested the patient's notes. Having seen the notes, she passed them together with the results to Doctor Dylan Murphy by placing them in his tray/basket. I was satisfied that there was nothing inherently wrong in Doctor Clarke having chosen to take such a step as Doctor Murphy was the last doctor at the practice to have seen Mrs Dalziel before the results were received and he was part of the team (along with Doctor Anderson) with which Mrs Dalziel was registered. That is in my view a reasonable step on the basis that Doctor Clarke would have reason to believe that her colleague would then take any necessary action. I accepted that the results were such that they indicated the need for further investigation with some urgency, albeit there was no emergency. Had there been a need for emergency action I would have expected Dr Clarke to have dealt with the matter immediately or have passed it personally to another doctor with an assurance that they would deal with the matter. Rather as happened with Dr Murphy passing Mrs Dalziel's care on to Dr Anderson on 21 November 2002. I am not satisfied that the receipt by Doctor Clarke of the telephone enquiry altered the status of these results or required them to be dealt with differently. Even the recording of his oral information about suspecting a connective tissue or rheumatoid problem would have added nothing to any subsequent doctor's understanding of the problem. Whilst I was pressed to accept that by failing to immediately act on these results personally Doctor Clarke had failed to act responsibly, I was satisfied that it was not unreasonable for her to transfer the case to another doctor to deal with.

[242] I was also pressed by the agents on behalf of the family to accept that it was unreasonable for her to have left the results and medical records in Dr Murphy's tray without passing the papers to him directly, particularly after receiving a telephone call from the hospital doctor who had taken the samples

and requested the analysis. All of the doctors from the practice who gave evidence said that such a system for transfer of papers was reasonable and appeared to work. I also heard that similar systems operated in other doctors' practices. In this case the system did, however, fail. I accept that Doctor Murphy did not, as intended, see the results or the patient's notes. Exactly why this happened will never be clear and this is not assisted by the fact that there are no records by administrative staff or by Dr Clarke as to when she saw the results (there is no receipt date stamp and Dr Clarke has not dated either of her entries). The temporary loss of these may have been contributed to by the fact that at most the results are likely to have been paper clipped to the front of the patient's records allowing for the possibly that the results slipped off. Alternatively the records may have been withdrawn from Doctor Murphy's tray without him seeing them, possibly even in preparation for Doctor Anderson seeing Mrs Dalziel for an appointment.

[243] Whatever system operated that should not have happened. Similar difficulties arise in relation to the Accident & Emergency form which was completed by the senior house officer at Gilbert Bain Hospital and entered Mrs Dalziel's records at some unascertained point prior to 21 November 2002. The test results and casualty sheet should not have ended up filed in the patient's record without it being clear that a doctor had instructed filing (which they had not). It was clear from looking at Mrs Dalziel's patient records that the results from her visit to Gilbert Bain hospital were not the only ones which were filed without an appropriate instruction being marked. For example at page 97C (of production 1) another set of laboratory results were stamped and filed but with no instructions for that to be done. Indeed the pro-forma stamp was unauthenticated in any way.

[244] Although the precise mechanism which led to these results being filed in the records without action will never be clear, had it been relevant to the cause of death I consider that there was enough evidence led for me to conclude that the systems at the Lerwick Doctors Group Practice for dealing with these results was defective. This is a conclusion I can draw without the need for expert evidence. There was evidence of a laxity in the administrative procedures in

respect not only of these results but also of other earlier results which were filed without any action stamp or record of having been dealt with; there is the lack of clarity about the system whereby the results arrived at the practice; and there was the evidence of stamps being out of date and of procedures not being adhered to uniformly. All of which leads me to conclude that even if in theory the system (if adhered to) was acceptable it was not in practice implemented in a way which meant that it operated as intended. A system which is not operated properly is no real system.

[245] There was no evidence led at the inquiry as to any auditing having been carried out of the systems which were operated by the practice and accordingly I concluded that it was not sufficient for doctors in the practice to simply say "we were not aware of the system having previously failed". A system without any provision for reviewing its operational capabilities seems to me to be no real system at all.

[246] After Doctor Anderson discovered (on 21st November 2002) that the blood test results were filed in the patient's records without any apparent action having been taken in the practice, Doctors Clarke and Anderson met the following day at the practice and spoke to staff in an attempt to reconcile what had happened; a more formal critical incident review took place involving Doctor's Krusche, Murphy, Anderson and Clarke along with another doctor from the practice (Doctor Coutts) together with Mr Carle, the reception manager and a nurse. As a result the practice agreed to a number of changes to attempt to ensure that laboratory results were not filed without being signed off and appropriately actioned, including reminding all staff not to file laboratory results unless initialled; a further review was carried out in the following January. The practice clearly took the incident seriously and attempted to review their own procedures although they did not suggest any fundamental change in the system for processing papers. There were some changes to the training of administrative staff and one person became responsible for the filing of results. Mr Carle did not, however, consider that there were any further changes which could be made that would avoid "human

frailty" of the type which is ultimately what the practice attributed the failure to take action on Mrs Dalziel's test results to.

[247] The very fact that despite an extensive inquiry within the practice and in the course of the Fatal Accident Inquiry no one could say when the laboratory results were received; when they were seen by Doctor Clarke; and when they were filed speaks volumes for the lack of control of administration. Such apparently mundane administrative matters may not seem the most important aspect of running a doctor's practice but the failure to have proper systems which are followed and are subject to review can lead to important patient information being missed. And that is clearly important.

6 SUMMARY OF CONCLUSIONS AND FORMAL DETERMINATION

[248] Mrs Gladys Dalziel, whose date of birth was 18 July 1950 was married to Mr Larry Dalziel and together they resided at 'Windyknowe', Gulberwick, Shetland. Mrs Dalziel died at Aberdeen Royal Infirmary at 07.00 hours on 22 December 2002 as a result of multi-organ failure. The cause of that multi-organ failure and thus the cause of her death was gram negative septicaemia. She also had a candida pneumonia which contributed to her death.

[249] Mrs Dalziel acquired a spinal infection (vertebral osteomyelitis). I am satisfied that she was suffering from this infection from at least the time of her first presentation to the Lerwick Doctors Group Practice on 14th September 2002 and for some days prior to that, the infection possibly having started while she was on a cruise with her husband in early September. The cause, or source of that infection is unknown but I am satisfied that the infection was of the staphylococcus aureus variety. The infection entered her lumbar spine from the blood flowing to the vertebrae. The disc lying between the L3 and 4 vertebrae was infected and from that disc the infection spread to her psoas muscle. It may then have tracked back to her spine.

[250] It is highly unusual for an otherwise well woman of age 52 to suffer from vertebral osteomyelitis. The symptoms which she initially complained of were consistent with the much more common degenerative back pain from which she had previously suffered.

[251] I am satisfied on the basis of the evidence led that there was nothing untoward in the way Mrs. Dalziel was dealt with by the doctors in the Lerwick practice prior to her attending at the Gilbert Bain Hospital, Lerwick on 27 October 2002. That hospital attendance at the Accident and Emergency department occurred when Mrs Dalziel was suffering from considerable pain. Although there was nothing in her symptoms to indicate a need to do so, blood samples were taken from her by the attending doctor and sent for testing. The results of those tests were transmitted to the Lerwick Doctors Practice but were not

acted on appropriately by any doctor in the practice. Had they acted upon these results any general practitioner dealing with Mrs Dalziel should have been able to identify that there was evidence of mild pyrexia indicating a possible infection and, combined with the other symptoms, a possibly significant underlying pathology, the most likely cause being metastatic or connective tissue disease. It would then have been appropriate for Mrs Dalziel to have been referred to a specialist for further investigation. Such further investigation might, in the first instance, have been to a resident or visiting consultant at Gilbert Bain Hospital, Lerwick. As a non-emergency referral she would have been seen around mid November 2002.

[252] That she was not so referred was attributable to failures in the system of administration of records at the Lerwick Doctors Practice for which all of the general practitioners in the practice at the time bear collective responsibility. These failings meant that the blood sample results and the associated record of attendance at the accident and emergency department of Gilbert Bain Hospital were filed in Mrs Dalziel's medical records without any action being taken by a doctor.

[253] I am satisfied on the balance of probabilities that the results were not with Mrs Dalziel's records when Dr. Anderson saw her and her husband on 28th October 2002. In relation to that attendance, I am satisfied that Dr. Anderson advised Mr and Mrs Dalziel to contact the surgery for the results in a few days but that she also said, as would have been the normal practice, that the surgery would contact Mrs Dalziel if there were any abnormalities shown by the results when they arrived.

[254] As it is not possible to say when the results were eventually filed in the papers, it is impossible to say whether, had he been normally diligent in reading her records prior to consultation, Dr. Krusche, who saw Mrs Dalziel on 7th and 15th November 2002, should have seen the test results. I am however satisfied that had Dr. Krusche exercised the normal diligence to be expected of a general practitioner in reviewing those notes prior to his consultation with Mrs Dalziel, he should have been alert to the fact that samples had been taken; that

the results were either filed but not marked to show that any action had been taken or were not filed and in either case the issue should have been discussed with Mrs Dalziel. In fairness the doctor acknowledged this in giving evidence. Further, and in any event, as Dr Krusche accepted that since, by his second consultation with her, Mrs Dalziel had been complaining of symptoms of low back pain (albeit with fluctuating signs of improvement) for at least two months, it would have been appropriate for him to consider further investigations as to the cause. That he did not do so may have been influenced by the limited role he saw himself having at each of these consultations (the first to deal with a request for a jury service excusal letter; the second to administer acupuncture) and the fact that he was due to see Mrs Dalziel again the week following the second appointment. Had he, however, taken the reasonable step of referring Mrs Dalziel to a consultant then I am satisfied that she would not have been seen by a consultant before she in any event suffered a vertebral collapse on 18th November 2002. This occurrence led to the practice being called out to Mrs Dalziel at home on 21st November 2002 and to her admission to the Gilbert Bain Hospital, Lerwick that day. Following x-ray examination at Gilbert Bain Hospital, it was thought that the vertebral collapse had a metastatic cause and Mrs Dalziel was admitted to Aberdeen Royal Infirmary the following day.

[255] At Aberdeen Royal Infirmary appropriate steps were taken to investigate the cause of her vertebral collapse; appropriate surgical intervention was carried out; the nature of the infection which led to the vertebral collapse was identified; and an appropriate anti-biotic regime was commenced to treat the infection. It would normally have been expected that Mrs Dalziel would have made a full recovery and I am satisfied that this 'original' infection was, as expected, brought under control that Mrs Dalziel's general condition improved and she started to mobilise. She continued to make a satisfactory recovery from that original infection until 16th December 2002 but thereafter her condition deteriorated and she died on 22nd December 2002. The deterioration was due to her acquiring a second infection (by the gram negative bacillus enterobacter aerogenes). This led to septicaemia. Mrs Dalziel also suffered from candida pneumonia. The enterobacter aerogenes infection and the

candida pneumonia each contributed to Mrs Dalziel's death but her death is primarily due to the septicaemia caused by the gram negative enterobacter infection. I heard no convincing evidence to satisfy me on the balance of probabilities that the second infection was linked to the first infection except in a peripheral way.

[256] Enterobacter aerogenes is to be found in the normal lower intestine where it is kept in balance. I did not hear evidence at the inquiry that would persuade me on the balance of probabilities as to the source of the enterobacter infection of Mrs Dalziel's blood system, although a number of theoretical explanations were suggested. As that was the proximate cause of death and as the only direct connection between that infection and the first infection was that the first infection to her admission to hospital, where she remained when the second infection was acquired, even if the spinal infection had been detected earlier, I am not satisfied that I am entitled to find that any systems failure or reasonable actings on the part of any doctors with a responsibility for Mrs Dalziel's care could have avoided this lady's demise. Accordingly I must limit my determination in terms of Section 6 of the Fatal Accidents and Sudden Deaths Inquiry (Scotland) Act 1976 to finding that Mrs Dalziel died at Aberdeen Royal Infirmary on 22nd December 2002 at 07.00 hours and that the cause of her death was gram negative septicaemia and candida pneumonia.

[257] The evidence led at this inquiry in relation to the cause of Mrs Dalziel's death was complex and in reaching my conclusions I had to consider very carefully the evidence of a number of well qualified expert witnesses with differing perspectives and sometimes contradictory explanations, in relation to the cause of death. I also had to separately consider the evidence of a number of competing 'expert' views as to the appropriateness of the actions of the Mrs Dalziel's Lerwick doctors. These witnesses had much time following the Mrs Dalziel's death to consider their evidence. Their contributions, even if contradictory, were always thoughtful. As so often in such inquiries when it comes balancing the views of experts judging the actions clinicians involved in a patient's care it is necessary to bear in mind that they have the benefit of hindsight not available to the treating clinicians. Except to the extent that I

have been critical of the administration of patient's records in the Lerwick Doctors Group Practice and the treatment of Mrs Dalziel on 7 and 15 November 2002, I consider that the other actions taken by doctors were reasonable given the state of their knowledge at the time. Moreover such criticisms as I have cannot be linked to Mrs Dalziel's death. I am not persuaded that even if the blood test results had been acted upon quickly and Mrs Dalziel had been referred for further specialist opinion or testing at an earlier stage that would have influenced the untimely death of this lady. It is clear therefore that I reject the fairly widespread criticism made by Dr. Cochran of the actions of the Lerwick general practitioners.

[258] This is a case in which the hospital doctors dealing with Mrs Dalziel care at the time of her death were struggling to find an answer to the question of what the cause of the second infection (which ultimately overwhelmed her) was. I regret to say that notwithstanding the very detailed examination during this inquiry of the circumstances surrounding Mrs Dalziel's death that question remains largely unanswered.

Formal Determination

[259] In terms of Section 6(1) of the Fatal Accidents and Sudden Deaths Inquiry (Scotland) Act 1976 I am satisfied that:

(a) Mrs Gladys Dalziel, who was born on 18 July 1950, and who resided at Windyknowe, Gulberwick, Shetland died at Aberdeen Royal Infirmary on 22nd December 2002 at 07.00 hours; and

(b) the cause of her death was gram negative septicaemia (due to the bacillus enterobacter aerogenes) and candida pneumonia both of which were acquired whilst she was a patient in Aberdeen Royal Infirmary having been admitted there on 22 November 2002 from Gilbert Bain Hospital, Lerwick, following her having suffered a vertebral collapse whilst at home on 18 November 2002. That vertebral collapse was caused by a spinal infection (due to the bacterium staphylococcus aureus) from which she had been suffering since at least 14 September 2002 when she first presented to the Lerwick Doctors Group

Practice with symptoms of low back pain, and which infection remained undetected until her admission to Aberdeen Royal Infirmary.

Sheriff

Lerwick, 30 January 2007

APPENDIX I

QUALIFICATIONS OF PROFESSIONAL WITNESSES AT THE INQUIRY

Independent Experts

1. Dr. David Farquharson MacBeth Cochran was aged 53 and in general practice as a doctor in Linlithgow. His professional qualifications are B.Sc. (Medical Science) in 1974 and MB.ChB (Edinburgh) in 1977 (with the award of the Annandale Gold Medal). Subsequently he has gained a Diploma in Forensic Medicine (Glasgow) and a Diploma from the Royal College of Obstetricians and Gynaecologists (DROG). He is a Fellow of The Royal College of Surgeons and a Fellow of The Royal College of Surgeons of Edinburgh.

   He has been a Registered Medical Practitioner for 27 years. He is currently Medical Director of Lothian Primary Care National Health Service Trust; medical director of the Forensic Medical Examiner Service; and an Expert Panel Member of the Care Standards Tribunal. He has a particular interest in medical provision in isolated rural communities having been Medical Officer in Charge to the Cayman Islands Government from 1986 to 1992 (his experience in general practice in the United Kingdom commenced in 1992).

   His work for the Lord Chancellor's Office in the Care Standards Tribunal involves consideration of GP records from across England and Wales. He is regularly asked to provide opinions on general practice matters, the overwhelming majority of reports being prepared on the instructions of claimants. He has previously given evidence in a Fatal Accident Inquiry in Perth but had appeared in court as a general practice expert witness less than half a dozen times.

2. Dr. William Alexander Hamilton Hunter is currently a Consultant in Anaesthetics and Intensive Care at Raigmore Hospital, Inverness, a position he has held for 8 years, having been a Consultant for 10 years. His professional qualifications are MB ChB (Glasgow 1985) and he became a Fellow of the Royal College of Anaesthetics in 1991.

3. Dr. Sharon Louise Edwards was aged 35. She qualified as a doctor in 1994. Her professional qualifications include MB ChB. She became a Member of the Royal College of Pathologists (MRC Path) in 2002. She is currently employed as a Consultant Pathologist at Ninewells Hospital, Dundee and was previously Specialist Registrar in the Department of Pathology at Aberdeen Royal Infirmary.

4. Mr David Charles Jaffray was aged 54. His qualifications include MB ChB (Aberdeen 1974). He is a Fellow of the Royal College of Surgeons in Edinburgh (FRCS (Edinburgh). He is a member of the British Scoliosis Society, the British Cervical Spine Association, the British Orthopaedic Spine Society and the British Orthopaedic Association (of which he is also a Council member). He is an examiner in orthopaedics for the Royal Colleges of Surgeons for the fellowship exams; Vice Chairman of West Midlands Orthopaedic Higher Surgical Training Committee; adviser in Spinal Surgery to the National Institute of Clinical Excellence (for England and Wales); honorary member of the Hungarian Orthopaedic Association; and President of the British Cervical Spine Society.

   At the time of the Inquiry he was Consultant Orthopaedic Surgeon and Clinical Director of the Robert Jones and Agnes Hunt Orthopaedic and District Hospital, Oswestry, Shropshire. He was also Consultant Spinal Surgeon to the Midlands Spinal Injuries Unit. He pent 1 day a week in spinal surgery and more than 1 day a week in a clinic devoted to problems of the spine. In addition to dealing with spinal injuries (including acute dislocations and fracture of the neck) he also has experience acquired since he worked in Hong Kong, in dealing with spinal infections which can require radical anterior decompressions and stabilisation posteriorly. His CV also discloses experience in spinal osteotomy (for both cervical and lumbar osteotomies in ankylosing spondylitis) and spinal tumours. However his main interests were in back pain, working with the radiology department and offering surgical rehabilitation to this large group of what he described as often neglected and severely disabled patients); and the cervical spine with special interest in dealing with problems of pain and pressure on the cervical cord.

   He is editor ‘The Oswestrian’, an internal journal of resident doctors’ research, co-author of a book: Bone Grafts and Bone Substitutes and contributing author of

chapters on spinal surgery, injuries and disorders in a number of textbooks, including a chapter on Osteoarthritis of Facet Joints and Lumbar Intervertebral Disc Disease in 'A Textbook of Orthopaedics for Physiotherapists'. His CV also lists 33 papers published in various medical journals and a significant number of presentations associated with spinal surgery.

5. Mr Andrew William Kent was aged 55. His professional qualifications include MB ChB (Edinburgh 1987). He is a Fellow of the Royal College of Surgeons in Edinburgh (FRCS (Edinburgh); and a Fellow of the Royal College of Surgeons (FRCS (Trauma and Orthopaedic Surgery).

He is a Consultant in Trauma and Orthopaedic Surgery at Raigmore hospital, Inverness, a position he has held for 3 years, although he has been a Consultant since August 2000. His principal interests are Spinal and Trauma Surgery. He has undertaken extensive training and maintains an active practice in both fields.

6. Dr. David Rubinstein was aged 66 and he was based at the Department of Medicine, Addenbrooks Hospital, Cambridge. His professional qualifications are M.B., B.S. (London) 1962 and MD (London) 1971. He became a member of the Royal College of Physicians (MRCP) in 1965; a Fellowship (FRCP) followed in 1979.

He held trainee posts in London and Ipswich; was a lecturer at Middlesex Hospital (1966-1967); a Registrar at Middlesex Hospital (1967-1969); a MRC Research Fellow and Department Member of the Communicable Disease Division at Northwick Park Hospital, Harrow (1969-1972); Consultant Physician at the University of Zaria, Nigeria (1972); and Consultant Physician at Addenbrooks University Hospital, Cambridge (1972-2003). He has held various other medical appointments including Director of the Division of Medicine, Director of Clinical Studies and Hospital Medical Director at Addenbrooks. He is a Fellow of and currently a Director of Clinical Studies at Trinity Hall Cambridge. His special interests include Acute General Medicine, Emergency Medical admissions and infectious diseases. He was responsible for setting up an infectious diseases unit at Addenbrooks Hospital and remained Director of that for 15 or 16 years before

becoming Medical Director Hospital and returning to a Consultant position in that speciality thereafter.

He has been responsible for a number of publications on Gastroenteritis, Hepatitis, Respiratory Infections and is responsible for text book contributions on infectious diseases and clinical medicine. He is responsible, along with a colleague, for writing the text book on infectious diseases "The Infectious Diseases Manual" one of the standard reference books in that area of medicine.

7. Dr. Daniel Rutherford was aged 51. His professional qualifications are BSc (Edinburgh - 1976) and MB ChB (Edinburgh -1979). He became a member of the Royal College of General Practitioners (MRCGP) in1995 and a fellow of the Royal college of Physicians (FRCP) in Edinburgh in 1999.

After qualification as a doctor he spent some time in hospitals in Edinburgh and Dundee and from 1984 to 1985 he was a trainee in general practice in St. Andrews, becoming a Principal in general practice from 1986 to 2000. From December 1999 until September 2004 he was Medical Director of a newly established internet based health information service which provided information intended primarily for the general public. This involved editing information and guidance written by others and also writing guidance. He was, at the time of the inquiry, a NHS and private GP. He is a contributing Medical Editor for the weekly medical publication "General Practitioner" and is the primary author of 15 titles in the "net doctor" book series.

8. Dr. Peter William Thornton was aged 57. He was senior partner in a 4 doctor general practice in Carnoustie. His professional qualifications are B.Sc. (Medical Sciences) 1969; MB.ChB 1972. He obtained a diploma in Obstetrics from the Royal College of Obstetricians and Gynaecologists (DROG) in 1975 and a Diploma in Anaesthetics (DA) from the Royal College of Surgeons in England that same year. He became a member of the Royal College of General Practitioners (MRCGP) in 1978; a member of the Faculty of Family Planning (MFFP) in 1994; and a fellow of the Royal College of General Practitioners (FRCGP) in 1995.

His post graduate experience includes (between 1972 and 1976) vocational training for general practice and since 1977 he has been a principal in general practice in Carnoustie. Additionally he has been an undergraduate tutor in general practice at Dundee University (from 1983 to 2003); is an Honorary Senior Lecturer in general practice at the University of Dundee (since 2003); is a post graduate trainer in general practice (since 1984); is a family planning instructing doctor (since 1988); was a member of the General Practice Clinical Advisory Panel for the Medical and Dental Defence Union of Scotland (between 1998 and 2004); is an external professional advisor to the Public Service Ombudsman (since 1999); is a performance assessor for the General Medical Council (since 1997); is an examiner for the Professional and Linguistics Assessment Board of the General Medical Council (since 2003); was course organiser for Tayside Practice Receptionists Programme (between 1989 and 1993); was course consultant for Tayside Practice Manager Development (from 1990 too 1992). He has also wide experience of sitting on various professional (medical) committees and is a member of the British Medical Association; the Royal College of General Practitioners; the Medical and Dental Defence Union of Scotland; the Faculty of Family Planning (of the Royal College of Obstetricians and Gynaecologists); and the Faculty of Anaesthetists. He is co-author of two publications which are not relevant for the purposes of this Inquiry.

He has acted as a general practice expert witness since 1999 having provided more than 150 reports on liability in cases of alleged medical negligence by general medical practitioners. In approximately one third of those he has been instructed by agents for claimants and two thirds by agents for defenders (doctors) in both Scottish and English cases. He has previously given evidence as an expert witness in the Court of Session and also in a Fatal Accident Inquiry.

Aberdeen Royal Infirmary

9. Professor Fiona Jane Gilbert was aged 49. Her professional qualifications are MB ChB (Glasgow – 1978). She was awarded membership of the Royal College of Physicians (MRCP) in1981); she holds a diploma in Radiology (DMRD) from Aberdeen (1984); is a fellow of the Royal College of Radiologists (FRCR) (1986);

and a fellow of the Royal Colleges of Physicians (FRCP) in both Glasgow (1991) and Edinburgh (1994).

She was appointed to the Chair of Radiology at Aberdeen University in 1996 and continues to work as a Consultant Radiologist at Aberdeen Royal Infirmary. She has previously worked as a Senior Registrar in Radiology, Registrar in General Medicine and Senior House Officer in General Medicine at the same hospital. In the early stages of her career she was a research assistant in Oncology with Professor Calman at Gartnavel General Hospital, Glasgow; house physician to Professor Arthur Kennedy at the Royal Infirmary, Glasgow; and house surgeon to Professor Sir Andrew Watt Kay at the Western Infirmary Glasgow.

Her current local clinical responsibilities include breast screening; symptomatic mammography; musculo-skeletal radiology (in which respect she has regular back meetings with orthopaedic staff and rheumatology case conferences); and general radiology. On a national level she has been a member of the Scottish Bone Tumour Registry Panel for four years; has been involved in setting up the Scottish Interval Cancer Database as part of the monitoring and evaluation group of the Scottish Breast Screening Programme; she is deputy chairman for Radiology for quality assurance for SBSP; and is the radiology representative on SIGN Breast Cancer Focus Group.

She has extensive educational responsibilities both locally and nationally and has been involved in both national and local research in the radiology field. She is also a referee for various publications, particularly in the radiology and cancer fields. She has written extensively (her CV includes 155 items under the heading peer review publications, a further 71 invited presentations, 12 other publications and four examples of contributions of chapters various books.)

10. Mr Emmanuel Kingsley Labram is aged 50 years. He qualified as a doctor in 1983 and is currently a neurosurgeon at Aberdeen Royal Infirmary, a position he has held since 2001. His professional qualifications are MB ChB. He is a Fellow of the Royal College of Surgeons in Edinburgh and a Fellow of the Royal College of Surgeons (Surgical Neurology).

11. Dr. Peter Bryce Randalls was aged 50. His professional qualifications are a BSc in Biochemistry (1978); and MB.ChB (1983). He became a Fellow of the Royal College of Anaesthetics (FRCA) in 1988.

He is currently a Consultant and Honorary Senior Lecturer in anaesthetics and intensive care medicine at Aberdeen Royal Infirmary/Aberdeen University. He has held this post since 2002 but had previously been a Consultant in anaesthetics and intensive care elsewhere in the United Kingdom. His appointment as a Consultant followed his holding various posts in anaesthesia/intensive therapy primarily in the United Kingdom. His CV records a number of publications featuring original research and case reports.

12. Dr. Yvonne Anderson was aged 33. Her professional qualifications include MB ChB. She is a member of the Royal College of General Practitioners (MRCGP); holds a diploma from the Royal College of Obstetricians and Gynaecologists (DFCOG) and the Faculty of Family Planning (DFFP). She qualified in 1995, is currently employed by NHS Shetland as a general practitioner at Lerwick Health Centre having previously been one of the principals in the Lerwick Doctors Group Practice there.

13. Dr. Gillian Anne Clarke was also, at the time of the Inquiry a general medical practitioner employed by NHS Shetland at Lerwick Health Centre having previously been one of the principals in the Lerwick Doctors Group Practice there. Her professional qualifications are: MB BS (London University 1986). She also holds a diploma from the Royal College of Obstetricians and Gynaecologists (DFCOG); is a Member of the Royal College of General Practitioners (MRCGP); and is a Fellow of the Royal Australian College of General Practitioners (FRACGP).

She qualified as a doctor in 1986, has been a GP for 15 years and worked at Lerwick Health Centre for 8 years (having spent one year as a GP in Australia). She was also a post-graduate tutor in Medical Education for Shetland; was on the Ethics Committee and the Therapeutic Committee; was a Police Surgeon; and

taught both undergraduates in medicine, nurses both in hospital and in general practice and post-graduate doctors including doctors carrying out post-graduate training but who were fully qualified general practitioners.

14. Dr. Martin Krusche was aged 39. He qualified as a doctor in Germany when he passed his Sate Exams in 1993. These are his basic professional qualifications. He also holds a Diploma from the Royal College of Obstetricians and Gynaecologists. He has worked with the Lerwick Practice from May 2000 formerly as a principal in the Group Practice now as an employee of NHS Shetland. He has an interest in acupuncture and offers this service to his own patients and the patients of other doctors in the practice.

15. Dr. Dylan Lloyd Murphy qualified as a doctor in 1997 and is currently employed as a GP at the Lerwick Practice having previously been a principal in the Lerwick Doctors Group Practice. His professional qualifications are MB. B.Ch. He also holds honours BSc in Pharmacology. He is a Member of the Royal College of General Practitioners (MRCGP).

APPENDIX II

GLOSSARY OF MEDICAL TERMS

The following descriptions of various medical terms used in the course of this inquiry have been collated from the evidence of the various professional witnesses. I consider it is appropriate to set out my understanding of these as they are relevant to the conclusions I have drawn.

1. Low back pain

This description is based primarily upon the evidence and report of Dr. Rutherford. His evidence was, I understand, largely based upon the UK Department of Health publication of July 2005 known as the PRODIGY Guidance on Lower Back Pain (http://www.prodigy.nhs.uk/guidance).Except for the evidence of Dr. Cochran I consider that all of the doctors' evidence pointed to an acceptance that Mrs Dalziel was presenting with symptoms of lower back pain and that there was no reason to suspect otherwise, until at earliest the end of October 2002.

Low back pain is a common problem in the population and accounts for around 4% of GP consultations with 60% to 80% of adults experiencing significant low back pain at some point in their lives (usually in the 30 to 50 year age range). 'Simple low back pain' refers to the commonest type of clinical picture in which pain is felt in the low back and often (70%) also in the buttocks or thighs. An exact cause for low back pain is usually not found. Less than 5% of patients have pain arising from trapping of nerve roots such as from a bulging inter-vertebral disc and only a minority of these will need or benefit from surgery. Spinal tumours or infections account for less than 1% of all cases. The natural history of low back pain is very variable and usually extends over many weeks or months. Pain and disability usually decrease rapidly over the first month and continue to decrease more slowly thereafter. Surveys suggest that at one month patients report pain to be reduced to a level of one third of that at presentation and by 3 to 12 months reduced to one quarter. The severity of a person's back pain and or its persistence is not a reliable guide to the nature of the underlying cause.

Spinal osteomyelitis is so unusual in the UK that a British GP is very unlikely to encounter a single patient with it in his or her entire professional career. GP's do however see large numbers of patients with lower back pain and manage them with the help of physiotherapists and prescription painkillers. Referral to specialists allows access to investigations such as scans that may help exclude serious pathology but in practice usually confirm the doctor's management regime in nearly all patients.

2. Spinal infection of the lumbar spine

This description is based primarily on Mr Jaffray's evidence and report. Tuberculosis apart, spinal infection is very rare in a healthy adult. Invariably it is seen in the vulnerable patient with a decreased resistance to infection. Diabetes, drug addiction, HIV patients, patients on high dose steroids, transplant patients and cancer patients on immuno-suppressive drugs, spinal surgery and direct injury through penetrating stab or bullet wounds make up the vast majority of spinal infections. In the frail, elderly, urinary or abdominal/pelvic sepsis can spread to the spine through a shared venous network but even these cases are rare. Once established the subsequent clinical path is slow rather than sudden. Referral to a spinal surgeon is invariably, if not always, delayed whether the patient is at home or in hospital. An audit by colleagues of Dr. Jaffray in Birmingham of their spinal infection patients highlighted a delay in referral to the specialist on average of 3 months for patients already in hospital in medical wards. A similar picture appeared in a survey in Oswestry by a registrar working in the spinal unit in Stoke. In preparation for the fatal accident inquiry, Mr Jaffray consulted with colleagues in Aberdeen and indicated that it was a similar picture there.

Early on in spinal infection cases plain x-rays can be worryingly normal. Blood tests too can be misleading. Clinically the back pain is usually attributed to the type of everyday degenerative disc disease everyone can experience. After a prolonged period of low grade pain, further investigations reveal changes suggestive of infection. Where that is found, the investigation of choice is an MRI scan which may reveal unmistakable signs of infection. The next vital step is a biopsy under

CT control to identify the organism responsible for infection and to identify the antibiotic to which the infection is sensitive. In the majority of cases the treatment is then bed-rest with antibiotics until there is bone ankylosis. Deformity in the lumbar spine is largely irrelevant. Surgery would be indicated if there is an abscess, the site of the abscess dictating the appropriate surgical approach.

3. Rhabdomyolysis

Rhabdomyolysis was first mentioned in Mrs Dalziel's case in hospital in Aberdeen. Mrs Dalziel's acute renal failure was dealt with by renal physicians who did not give evidence to the inquiry. None of the medical witnesses to the inquiry appeared to have particular expertise in rhabdomyolysis. However a number had some experience or knowledge of it and gave evidence upon which the following summary is based.

As it was explained to me rhabdomyolysis results from an injury which damages the integrity of skeletal muscle leading to the breakdown of muscle tissue and the release of a potentially toxic enzyme (creatine kinase) into the circulation. The psoas muscle is such a skeletal muscle. The primary indicator of rhabdomyolysis is an elevated creatine (phospho) kinase (CK) level.

According to Dr. Randalls (consultant in anaesthetics and accident and emergency medicine) the common causes of rhabdomyolysis are trauma, infection and drugs, the trauma often being associated with the type of crushing injuries sustained in an earthquake. Dr. Randalls considered that he had a fair amount of experience of rhabdomyolysis leading to multi-organ failure; however that was usually with intravenous drug abusing patients. Dr. Rubenstein gave evidence that rhabdomyolysis is rare. In a period of ten years he had made a diagnosis of this condition in only two cases. Despite his considerable expertise in the field of infectious disease he indicated that he had never encountered rhabdomyolysis in connection with infection. Significantly (at page 164 – 20/2/06) he says in relation to rhabdomyolysis "I am not aware of it occurring with infection. I have never seen it. It must be extremely uncommon if it does occur in association with infection". When asked whether I should accept that infection can cause rhabdomyolysis he

responded “Well it would have to be speculative and until, unless one had a different explanation, it does not prove it of course”.

According to Dr. Rubenstein, rhabdomyolysis cannot be treated. The approach is to monitor renal function whilst effort is focussed on dealing with what is causing the rhabdomyolysis. That ‘conservative’ approach can be taken unless or until dialysis is indicated.

4. Royal College/PRODIGY Guidelines on low back pain

There was repeated reference during the inquiry to clinical guidelines on the treatment of acute low back pain. These guidelines were produced to the Inquiry in a number of documents, some fuller than others. The full guidelines published by The Royal College of General Practitioners (together with other organisations) are production 10. These guidelines date back to September 1996 but had been reviewed in December 2001 and were therefore the guidelines in place at the time of Mrs Dalziel’s presentation to the Lerwick Group practice doctors. Included with these is a summary chart (page vi). There was some evidence in the inquiry that these guidelines applied only to patients during the course of the first four to six weeks of presenting with symptoms and that persistence of any symptoms for longer would lead to immediate referral to a specialist or to more thorough investigative techniques being applied. It does not seem to me from my detailed reading of the guidelines or the evidence given at the inquiry that such is a fair interpretation of the guidelines. Were that to be the general interpretation then there would not be the routine delays in referral to spinal surgeons I heard evidence of from Mr Kent and Mr Jaffray)

The fact that there was some confusion about or misinterpretation of the import of these guidelines suggested to me at one stage in the Inquiry that it might be for me to include some finding that revisal and clarification of the guidelines might be useful. As it was I heard evidence that these Royal College guidelines have been replaced by the PRODIGY guidelines referred to above and I have found it unnecessary to do so.

Be that as it may, the guidelines which existed for GP's at the time of Mrs Dalziel's presentation in Autumn 2002 (with symptoms which I accept are consistent with low back pain) were simply that, guidelines which should not replace the exercise by the doctor of clinical judgement. It seems to me that what the guidelines advocate is the use of a diagnostic triage to inform decisions about referral, investigation and management of the patient. That should be based on the clinical history and examination of the patient leading to a categorisation of: simple back pain, backache (non-specific low back pain); nerve root pain; and possible serious spinal pathology (tumour, infection, inflammatory disorders cauda equina syndrome etc.)

For simple backache, specialist referral is not indicated. This the guidance indicated would cover presentations of individuals in 20 to 55 year age range; with lumbo-sacral, buttock and thigh pain which was "mechanical" pain and the patient was otherwise well. Whilst more serious, however, even there was nerve root pain, specialist referral was said not to be generally required within the first four weeks providing that the symptoms were resolving. This 'nerve root pain' category includes cases where unilateral leg pain was worse than low back pain; where there was radiation of pain to the foot or toe; where there was numbness and paraesthesia in same distribution; where straight leg raising produces leg pain; and where there are localised neurological signs. Serious spinal pathology was indicated by what were termed "red flags" and the treatment suggested was consideration of prompt investigation or referral (that is in less than 4 weeks). This latter category includes presentations at under age 20 years or where the onset occurs at over 55; where there was non-mechanical pain; where there was thoracic pain; where there was a past history of carcinoma, steroids or HIV; where the patient was generally unwell and showing weight loss; and where there were widespread neurological symptoms or signs; with structural deformity. A further category of cases requiring emergency referral were referred to as ones which showed cauda equina syndrome (the evidence for which is sphincter disturbance; gait disturbance; and saddle anaesthesia).

I consider that Mrs Dalziel presented to the doctors in Lerwick with symptoms which the guidelines would categorise as simple back pain. Leaving aside the

question of the evidence of a low grade infection (following the obtaining of blood samples at Gilbert Bain Hospital at the end of October 2002) there is nothing in the guidelines to indicate that with the symptoms Mrs Dalziel was suffering from it became mandatory at any stage prior to her vertebral collapse on or about 18 November 2002 for her to be referred for specialist treatment or indeed for x-ray examination. She first fell into one of the categories suggesting immediate referral when she showed structural deformity when seen by Dr. Anderson on 21st November 2002.

The guidelines contain recommendations for use of pain killers and muscle relaxants in treating low back pain. The Inquiry heard evidence that this is not simply intended to provide pain relief but also to aid the healing process by avoiding patients adopting un-natural postures to relieve pain.

These guidelines also deal with the question of use of x-rays in cases involving back pain. It appears that this part of the guidance is based on United States (Agency for Healthcare Policy) research from 1994 offered in its original form as follows:

"Plain x-rays are not recommended for routine evaluation of patients with acute low back problems within the first month of symptoms unless a red flag is noted on clinical examination. Plain x-rays of lumbar spine are recommended for ruling out fractures in patients with acute low back problems when any of the following red flags are present, namely, recent significant trauma (at any age), recent mild trauma (patient over the age of 50), history of prolonged steroid use, osteoporosis, patient over the age of 70."

The guidelines proceed to deal with use of plain x-rays in combination with other imaging approaches or bone scans where other red flags (which are not relevant in Mrs Dalziel's case). The guidance concludes with a note that the routine use of oblique views on plain lumbar x-rays is not recommended for adults in the light of the increased exposure to radiation. Also included in the guidelines is a table suggesting that there is no indication for routine x-rays in acute low back pain of less than 6 weeks in the absence of clinical red flags; and that unnecessary repeated

x-rays should be avoided. It is in this context that it would be fair to say that there is the potential for confusion from the structure of these guidelines in that the reference to not taking x-rays before 6 weeks may be interpreted as a suggestion that after 6 weeks they should be taken. That is not what they say. Their value would be a matter of the exercise of clinical judgement. It is in this context that Dr Krusche's concession that he might have taken additional steps having seen Mrs Dalziel in November for jury duty excusal and acupuncture should be seen.

5. The Spine

Except where otherwise indicated this summary is based on the evidence of the pathologist Doctor Edwards

Structure of the human spine

The spine is composed of a series of ring-like bones known as vertebrae forming the spinal column. The spinal column classified into separate sections each composed of a number of vertebrae. The cervical vertebrae support the neck; the thoracic vertebrae are next down the spine and then there is the lumbar section with which was implicated in Mrs Dalziel's case. Within each section, the individual vertebrae are numbered each starting with number 1. The lower the number the higher on the spine it is. In the lumbar section there are five vertebrae known as the five lumbar vertebrae. These are denoted as L1 to L5.Accordingly, L4 represents the lumbar vertebra second from the bottom of the lumbar spine and L3 the one above, that is the 3rd from the top of the lumbar spine. Between and separating adjacent vertebrae lie vertebral discs. The disc implicated in Mrs Dalziel's case is that lying between the L3 and L4 vertebrae.

Low back pain

Low back pain relates to pain associated with this lumbar region of the spine.

Spinal cord (per Mr Jaffray)

The centre of each vertebra has a hole through which the more delicate spinal cord passes. This is cord comprises a bundle nerves which control important body functions. The individual nerves branch out at different levels. Below

L1, that is in the lumbar region, the cord contains primarily the nerves controlling the legs.

6. Blood testing for infection

At the Inquiry there was evidence about 2 standard blood tests which may indicate the presence of infection. ESR (or erythrocyte sedimentation rate) is a test applied to samples of blood which is a non-specific screening test for various diseases. A raised level can indicate infection or inflammation. Mr Jaffray described this as the test he was most used to using. Another more recent test, which I understood was also in routine use, is known as the CRP (or C-reactive protein) test. This can also indicate the presence of infection or inflammation.

7. Intravenous lines

A PICC is a long, thin, flexible tube known as a catheter. It is inserted into one of the large veins of the arm (near the elbow) and is pushed into the vein until the tip rests in one of the large veins in the chest. It is used to take blood samples, deliver medication (such as antibiotics) and fluids to patients. A central line is similar but inserted a point near the collar bone, closer to the large vein in the chest.

8. Radiography

This summary is based on the evidence given to the inquiry by Professor Gilbert. Her evidence (page 7 - 20/2/06) was that there is no CT scanner or MRI scanner in Shetland. Patients who need either of these procedures are transferred to Aberdeen. Shetland does, however, have access to x-ray. I heard evidence about all 3 imaging techniques at the Inquiry. It could be said that the three techniques (x-ray, CT and MRI) increase in sophistication.

X-ray

This technique uses x-ray radiation to produce a two dimensional image of the body much like a camera image. The whole of the body contents in the area covered by the particular examination are displayed in a two dimensional form. Accordingly, if a frontal image is taken that shows everything between the front of the body and the back; similarly if a lateral image is taken, everything is shown from one side of the body to the other. CT and MRI images are three dimensional and contain more information because of the ability to differentiate different organs from bony structures and soft tissue.

Computerised Axial Tomography scanning

CT or CAT scans also use x-ray radiation. It involves a series of pictures being taken in multiple thin sections through the body (in Mrs Dalziel's case the abdomen and lumbar spine). This technique (unlike MRI) is limited to two axial sections of the body. The images produced on a CT scan are reproduced in three dimensions and give excellent information on bones and some information on soft tissues and organs (such as the liver, spleen and heart).

MRI or Magnetic Resonance Imaging

This is the most sophisticated of the 3 techniques and uses a different form of wave to create images. Rather than x-ray radiation, magnetic resonance imaging uses magnetic and radio waves to produce the image. The major advantage of this seems to be that it is possible to take sections through the body on any plane chosen although normally sagittal, coronal or axial sections are taken. Axial is a cross-section through the body in a horizontal plane. Sagittal is like slicing the body in half from head to toe. Coronal is similar and includes sections slicing the body from head to toe on a frontal plane. As no radiation is involved this technique provides good information on bone but also excellent contrast information on soft tissues.