



# In The Supreme Court of Bermuda

**CIVIL JURISDICTION**

**2012: No. 98**

**BETWEEN:-**

**KAMAL WILLIAMS**

**Plaintiff**

**-v-**

**THE BERMUDA HOSPITALS BOARD**

**Defendant**

## **JUDGMENT**

Date of hearing: 3<sup>rd</sup> – 4<sup>th</sup> December 2012

Date of judgment: 9<sup>th</sup> January 2013

Mr Jai Pachai, Wakefield Quin, for the Plaintiff

Mr Allan Doughty, Trott & Duncan, for the Defendant

### **Introduction**

1. The Plaintiff, Kamal Williams (“Mr Williams”), attended the Emergency Department (“ED”) at King Edward VII Memorial Hospital (“the Hospital”) complaining of a pain in his right abdomen. He complains that the Defendant, The Bermuda Hospitals Board (“BHB”), negligently failed

within a reasonable time to diagnose that he had appendicitis and to treat him for it by removing his appendix.

2. Eventually, appendicitis was diagnosed and his appendix was removed. By the time of its removal the appendix had ruptured. Sepsis from the ruptured appendix caused injury to his heart and lungs.
3. Mr Williams does not criticise the standard of care that he received from the individual doctors who treated him. Rather, he submits that BHB was negligent in that it failed to have in place an adequate system for the diagnosis and treatment within a reasonable time of patients arriving in the ED with appendicitis (“an Adequate System”).
4. Mr Williams submits that had he been correctly diagnosed and treated within a reasonable time, his appendix would have been removed before it ruptured, or at least shortly after the process of rupture had begun, and that none of these complications would have arisen. Thus he submits that they were caused by the lack of an Adequate System.
5. I was assisted by the able presentation of counsel: Jai Pachai, who was counsel for Mr Williams, and Allan Doughty, who was counsel for the BHB.

### **Evidence**

6. I have had the benefit of evidence for the Plaintiff from Mr Williams and for the Defendant from the various doctors who attended him at the Hospital. By consent, statements from all these witnesses were taken as read. At my invitation, one of the doctors, Dr Di Lullo, was called to give oral evidence to clarify a specific point in her evidence.
7. I have also had the benefit of the contemporaneous medical records produced in the course of Mr Williams’ treatment and a root cause analysis (“RCA”) produced by the BHB. This analysed why it took the time that it took to diagnose and treat Mr Williams and whether there were any lessons to be learned.

8. I heard oral evidence from Dr Michael Leitman, Chief of the Division of General Surgery at Beth Israel Medical Centre in New York, who gave expert evidence on behalf of the Plaintiff, and Dr Alasdair Conn, who is the Chief of Emergency Services at Massachusetts General Hospital, who gave expert evidence on behalf of the Defendant. I am grateful for their assistance.
9. Dr Conn's CV, which runs to 47 pages, indicates on page 3 that he has been "*Clinical Advisor for the Trauma and Complex Emergency Service Programme at King Edward VII Memorial Hospital, Bermuda*" since 2009. Neither counsel noticed this until after the hearing. Given the length of the CV this is understandable. It would have been better if the Defendant's counsel had drawn it to the Plaintiff's attention prior to the hearing. Now that it has been drawn to my attention, however, it does not affect my assessment of Dr Conn's credibility.
10. I have also read an expert report tendered on behalf of the Defendant from Dr Randall Zusman, a heart specialist who works at the Cardiac Unit of Massachusetts General Hospital and is an Associate Professor of Medicine at Harvard Medical School.

### **Timeline**

11. On 30<sup>th</sup> May 2011, probably at around 10.15<sup>1</sup>, Mr Williams, who was 39 years old, began to experience abdominal pain in the right lower quadrant of his abdomen. He was at work at the time. A co-worker took him to the Hospital's ED, where he arrived at 11.17. Mr Williams suggested to the staff that the pain might be caused by appendicitis as his siblings had suffered from this.
12. At 11.40 Mr Williams was examined by Dr Chikezie Okereke. On examination he appeared to be in considerable pain, as he was screaming and tossing about in his bed. Dr Okereke noted that there were various

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<sup>1</sup> All the times in this judgment are given using a 24 hour clock.

possible causes: a kidney stone, appendicitis, or a perforated viscus (ie the wall of the colon may have begun to perforate). The doctor instructed a nurse to administer a painkiller and directed that blood and urine samples be taken.

13. Around 30 minutes later, Dr Okereke re-examined Mr Williams, who was now more comfortable. The examination suggested that Mr Williams was not suffering from peritonitis (ie an inflammation of the peritoneum within the abdominal cavity), which had been another possible cause of the pain.
14. Dr Okereke ordered a CT scan of Mr Williams' abdomen. He states that he did so "*approximately an hour*" after Mr Williams arrived in the ED. That would have been around 12.15. However the RCA states that a CT scan was ordered at 13.10 and – which would tend to support this – that a faxed requisition was received by the Diagnostic Imaging ("DI") Department at 13.30. I find that the time given in the RCA is probably correct.
15. Shortly after ordering a CT scan Dr Okereke spoke by telephone to a technician in the DI Department, who told him that the Department was very busy that day and that there was a long queue of patients waiting for CT scans.
16. As there was nothing in Mr Williams' blood work that suggested that his colon or appendix had ruptured or that he was suffering from septicaemia, Dr Okereke thought that he was not in immediate danger and could wait for the results and interpretation of a CT scan. He stated that it is generally prudent to have a CT scan taken of a patient suffering from an acute abdomen prior to operating on that patient so as to avoid surgery that ultimately proves unnecessary.
17. At 14.44 Dr Okereke called the DI Department again and stressed that Mr Williams needed to undergo a CT scan. A technician told him that the Department was still very busy, but that a CT scan would be conducted as soon as practicable.

18. Shortly after 15.00, Dr Okereke spoke with the nurse who was caring for Mr Williams. She told him that the DI Department was still busy but that the queue of patients waiting for CT scans had shortened.
19. The notes made by Dr Okereke on the day show that at 15.19 Mr Williams' pulse rate was abnormally rapid at 118.
20. Shortly before 16.00, a technician from DI gave Mr Williams a soluble imaging dye, which he drank, so that his organs would show up better on the CT scan.
21. At 16.00, Dr Okereke ended his shift and at 16.17 he handed over care of Mr Williams to his successor, Dr Di Lullo. Giving oral evidence, she explained that she examined him at 16.18 although she did not type up her notes of that examination until later. The notes record that there was severe abdominal tenderness in the right lower quadrant and that rebound tenderness was present. Rebound tenderness means that the patient experiences pain when his belly rebounds back to its normal shape after the doctor applies and then removes pressure from the belly.
22. At 17.12 Mr Williams was taken to the DI Department for a CT scan. This took place at 17.27. Dr Di Lullo examined him again at 17.38, shortly after his return to the ED. He was no longer suffering from rebound tenderness. Dr Di Lullo concluded that Mr Williams' condition was stable, that he was not in immediate danger, and that his anticipated surgery could wait for the report of the CT scan to arrive.
23. At 17.50 Dr Di Lullo paged Dr Stephen Witchell, who was the on-call radiologist for the evening. Dr Witchell did not answer. He was feeling unwell that evening and, having spoken to a DI technician, went home. It is not clear whether he left before or after Dr Di Lullo paged him.
24. The DI Department closed at 18.00 every day. All the diagnostic imaging for the day that remained to be read would be sent electronically to an overseas reporting agency for interpretation. The agency read the imaging

and sent the interpretative reports back electronically to the Hospital. That is what happened with Mr Williams' CT scan.

25. The report of the CT scan states that the "*Study Arrival Date*" was 30<sup>th</sup> May 2011 at 17.27 and that the "*Report Approval Date*" was 30<sup>th</sup> May 2011 at 18.19. Those are the respective times at which the CT scan arrived at the overseas reporting agency and the report on the CT scan was approved prior to being sent to Bermuda.
26. However by 19.00 Dr Di Lullo had not received the report. She stated that at 19.38 she visited Mr Williams after receiving the interpretation, from which I infer that she did not receive the interpretation until shortly before that visit.
27. The report was prepared by Dr Christopher Pozza. It stated "*Rule out perforation*" and continued: "*There is a dilated fluid filled appendix in the right lower quadrant with significant peri-appendiceal fat stranding present. There is some free intraperitoneal fluid noted deep in rectovesicle pelvis. The findings are consistent with acute appendicitis.*"
28. Dr Di Lullo discussed the interpretation of the CT scan with Dr Council Miller, who was the surgeon who was to operate on Mr Williams. Dr Miller notes that on review of the report, it appeared to him that the radiologist had been unable to determine the nature of the "*free fluid*" within Mr Williams' pelvis. Dr Miller also noted that no free air was reported in the study to suggest perforated abdominal viscus or a perforated appendix.
29. Dr Miller agreed with Dr Di Lullo that Mr Williams was suffering from an acute abdomen with peritonitis, secondary to acute appendicitis, and ordered that he be admitted and transported to the Operating Theatre for surgery, namely the removal of the appendix. Dr De Lullo handed over care of Mr Williams to Dr Miller at 20.54. Dr Miller explained the situation to Mr Williams, who gave his informed consent to the operation.
30. Mr Williams was prepared for surgery and anaesthetised. The anaesthetic was administered at 21.30. Dr Miller removed Mr Williams' appendix. He

determined that Mr Williams was suffering from acute appendicitis and that his appendix was ruptured (or “perforated”). He also noted the widespread presence of pus throughout his pelvis with phlegmon around his liver and cecum (a pouch at the beginning of the large intestine from which the appendix hangs). From the presence of the phlegmon he concluded that the pus had been there for “*some time*”.

31. During surgery, Mr Williams developed complications caused by sepsis resulting from his ruptured appendix. He suffered from haemodynamic instability. His blood pressure became precariously low. He developed a dangerous rhythm disturbance of the heart known as ventricular tachocardia. The surgery was expeditiously completed. But further events occurred indicating that Mr Williams suffered from what Dr Leitman described as a heart attack and Dr Conn described as a cardiac event. An electrocardiogram of his heart showed abnormalities consistent with cardiac ischemia (diminished or impaired coronary blood flow to the left ventricle of the heart muscle). He also suffered a lung injury known as ARDS (“Adult/Acute Respiratory Distress Syndrome”).
32. As a result of these 2 conditions, Mr Williams required life support in the intensive care unit, which involved medication to support his blood pressure and heart. He was placed on a mechanical ventilator with a breathing tube placed into his lungs to support his breathing.
33. Mr Williams was in hospital for 2 weeks and was not fit for work for another 7 weeks. A letter dated 10<sup>th</sup> August 2011 from Dr Margot Harvey, his general practitioner, stated that since surgery he had on and off excessive flatulence, gaseous pain, and cramp on the right. She stated that he may have developed adhesions as a complication of the rupture.

### **The RCA**

34. The Hospital conducted a RCA dated 7<sup>th</sup> June 2011 into Mr Williams’ case, noting that the family had questioned the delay in his care prior to surgery. The RCA identified a number of controllable factors that directly affected the outcome.

- (1) The Hospital doesn't have a policy or protocol to establish behaviour for STAT<sup>2</sup> diagnostic tests like a CT scan. Eg a doctor to doctor phone call.
- (2) The current process is technician-dependent. *“DI Techs should not be required to be the gatekeeper of scheduling STAT CT scans”*.
- (3) The overseas reporting agency reading of the CT scan was not available to the doctor in the ED for more than an hour.
- (4) The urgency of the case was not communicated to the on-call radiologist through doctor to doctor communication.
- (5) The Hospital doesn't have a policy or protocol that outlines the process for patients that need surgical evaluation in the ED deemed to be an acute abdomen by the ED doctor before diagnostic tests are performed.
- (6) The Hospital does not have a process in place to expedite results from the overseas reporting agency for the timely reading of exams in the absence of the on call radiologist.

35. The RCA also proposed some risk reduction strategies.

- (1) Develop appropriate criteria for CT scans ordered as STAT.
- (2) Develop a formal protocol/guideline for CT scans ordered as STAT and provide education for DI, ED and other appropriate staff.
- (3) Send a memo to doctors to ensure that acute CT cases do not get delayed for scheduled cases immediately.
- (4) Develop a formal protocol/guideline for emergency consults to include acute abdomen.

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<sup>2</sup> From the Latin *“statim”*, meaning *“immediately”*.



### **Expert evidence**

36. The expert evidence focused on 3 issues:
- (1) When the appendix began to rupture.
  - (2) Whether Mr Williams was diagnosed and treated with sufficient expedition, with particular reference to the time taken to obtain and interpret the CT scan.
  - (3) Whether Mr Williams has sustained any permanent cardiac or intestinal injury.

### **When the appendix began to rupture**

37. Both experts agreed that rupture of an appendix is not instantaneous but rather a process. It is common ground that Mr Williams' appendix had begun to rupture prior to surgery. With benefit of hindsight, this is evidenced by his abnormally rapid pulse rate of 118 at 15.19; his rebound tenderness at 16.18; and the "*free fluid*" within his pelvis which was disclosed by the CT scan. Dr Leitman stated that rebound tenderness is indicative of rupture, and that its presence at 16.18 should have been a red flag to the examining doctor. Dr Conn, however, stated that it is often difficult to say whether rebound tenderness is a conclusive test of whether an appendix is ruptured, and noted that when Mr Williams was re-examined at 17.38 his condition appeared to have improved.
38. Dr Leitman stated that in his opinion the appendix had started to rupture at around 15.19. There was, he said, no evidence that it had started to rupture any earlier. Indeed the examinations carried out by Dr Okereke and the blood work suggested that it had not.
39. Dr Conn disagreed. He stated that the appendix had probably started to rupture before Mr Williams arrived at the hospital, most likely when he had started to feel abdominal pain at around 10.15. He based this opinion on the

fact that Dr Miller found pus and phlegmon in the abdomen but did not mention the presence of any fecal matter.

40. Dr Conn explained that when an appendix ruptured this would release fecal matter into the abdomen. He would therefore have expected some fecal matter to be present if the rupture had been recent. The rupture would also have caused white blood cells from the bloodstream to enter the abdominal cavity, which they would have started to do 1 or 2 hours after the appendix began to rupture. There they would have started to ingest the fecal matter. The white blood cells would then eventually have died, becoming pus.
41. Dr Conn stated in his oral evidence that it takes longer than a few hours to develop an accumulation of pus that is visible to the naked eye. He noted that the surgeon had found there was pus all over the abdomen. Dr Conn stated that he didn't believe that this could accumulate in 2 or 3 hours and was much more likely to have accumulated over at least 24 hours, despite Mr Williams' lack of symptoms for much of that period. In his written report he stated that it would take between 12 and 48 hours for the process to occur.
42. Dr Conn also commented on the presence of phlegmon, which he explained was the reddened inflamed surface of an organ following contamination. He stated in chief that it took several hours for phlegmon within the abdomen to form. When cross-examined, he clarified that by this he meant 4 to 6 hours at the earliest. However he stated in a supplementary written report:

*“I would expect that a phlegmon at the earliest to be 12 hours and more likely more than 24; most likely 48 to 72 hours. The same time course is for the development of pus – for pus perhaps 24 hours longer.”*
43. Dr Leitman, on the other hand, stated that the amount of pus observed by Dr Miller could have formed in a matter of a few hours. He said that the development of pus in the abdomen was dependent on a variety of factors. These included, in the case of a ruptured appendix, the size of the rupture, the virulence of the bacteria that the white blood cells had ingested, and the patient's own factors. Dr Leitman stated that he had seen patients who had

presented in a similar way to Mr Williams who had developed a substantial amount of pus in a matter of hours.

44. Dr Leitman also stated that one would not typically expect to see fecal matter present after a perforation of the appendix no matter how long the pus had taken to build up. He was not asked to comment specifically on the formation of phlegmon. However he explained that leakage of fluid from the appendix can cause the lining of the abdominal cavity, known as the peritoneum, to become inflamed.

**Whether Mr Williams was diagnosed and treated with sufficient expedition, with particular reference to the time taken to obtain and interpret the CT scan**

45. Dr Leitman and Dr Conn both agreed that it was appropriate to perform a CT scan before a decision was taken to operate on Mr Williams. As Dr Leitman explained, today the majority of hospitals use CT scans to help identify a precise diagnosis and to reduce unnecessary appendectomies. Neither criticised the time taken to order a CT scan or the time taken to get Mr Williams to the operating room once a CT scan had been obtained and interpreted.
46. However Dr Leitman was critical of the time taken to obtain and interpret a CT scan once one had been ordered. He stated that when Mr Williams presented to the ED he had an emergency, namely the signs and symptoms of appendicitis. The appendix had not yet ruptured. As a result of the delay in carrying out a CT scan and interpreting the results, Mr Williams suffered from a rupture of his appendix and ensuing complications, namely sepsis, that caused a heart attack and lung injury. Had his condition been promptly diagnosed and treated, the resultant heart attack and lung injury would not have occurred.
47. In Dr Leitman's opinion, the CT scan should have been obtained on a STAT basis and the operation should have been performed within 4 hours of the CT scan being ordered. Specifically, he stated that if the CT scan was

ordered at 12.15, in the normal course of events it should have been performed and read by 13.30 and the operation should have taken place within the hour at around 15.30.

48. Dr Leitman considered that the recommendations in the RCA were reasonable, and that, if implemented, they would meet the appropriate standard of care. I asked him about the possibility that there were other urgent cases that would have been ahead of Mr Williams in the queue for a CT scan even if Mr Williams' CT scan had been ordered on a STAT basis. Dr Leitman replied that if there were any such cases he would expect them to be mentioned in the RCA. As none were mentioned there he concluded that there were none.
49. Dr Leitman cautioned against reliance on studies in peer reviewed medical journals, stating that in interpreting such studies one must be careful to look at the size of the sample, the length of time over which the study was carried out, the age of the study, and the hypothesis of the authors. He stated that such studies did not determine standards of care, as they reflected upon large groups of patients with a variety of presentations. They could therefore only be used to determine whether the authors' hypothesis could be proven.
50. Dr Conn attached much greater importance to such studies. They informed his stated opinion that where a patient presents to the ED with acute appendicitis, then provided that the time between presentation and surgery is no greater than 12 hours, an appropriate standard of care will be met. An appropriate standard of care had been met in the case of Mr Williams as the interval between presentation and surgery was only 10 ¼ hours.
51. Dr Conn referred to 4 studies in particular, although he also mentioned others. The 4 studies did not all point one way. All 4 studies were retrospective, which, he accepted, allowed for the possibility of conscious or unconscious authorial bias. I did not understand Dr Conn to be saying that the studies set a standard of care, for, as Dr Leitman stressed, that was not their purpose. However they did provide information about how long it took other hospitals to treat patients with appendicitis, and about the effect of

delays in treatment. This information was helpful when assessing whether in the case of Mr Williams an appropriate standard of care had been met.

### *The Earley Study*

52. The first study was carried out by Angela Earley and others from the Department of Surgery, University of Pennsylvania School of Medicine.<sup>3</sup> The objective of the study was to compare outcomes of appendectomy in an Acute Care Surgery (“ACS”) model, where the surgeon was based in-house, to a traditional home-call attending surgeon (“TRAD”) model, which is closer to the model at the Hospital.
53. The study involved a review of appendectomies that took place at the participating hospital between September 1999 and August 2002. During the study period, 294 appendectomies were performed. ACS surgeons performed 167 procedures and TRAD surgeons performed 127 procedures.
54. The study concluded that in patients with acute appendicitis, the presence of an ACS surgeon significantly decreased the time to operation, rupture rate, complication rate, and hospital length of stay. The rupture rate for patients treated under the TRAD model was 23.3 per cent but for patients treated under the ACS model it was 12.3 per cent.
55. The finding on which Dr Conn relied was that the time taken from presentation at the ED for the patient to reach the Operating Room was an average of 10.1 hours under the ACS model and an average of 14 hours under the TRAD model. There was a standard deviation from the average of around 70 per cent.

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<sup>3</sup> An Acute Care Surgery Model Improves Outcomes in Patients With Appendicitis. *Annals of Surgery*, Volume 244, Number 4, October 2006.

### ***The Abou-Nukta study***

56. The second study was carried out by Fadi Abou-Nukta and others from the Department of Surgery, Hospital of Saint Raphael, in New Haven, Connecticut. The objective of the study was to determine whether delaying appendectomy for 12 hours to avoid disturbing the operating room schedule and to minimize the number of operations during the night negatively affects the outcome of patients with acute appendicitis.
57. The study involved a review of appendectomies that took place at the participating hospital between 1<sup>st</sup> January 2002 and 31<sup>st</sup> December 2004. 309 patients were included in the study. Patients were divided into 2 groups. The early group comprised patients who had undergone appendectomies within 12 hours of presentation at the ED. The late group comprised patients who had undergone appendectomies more than 12 – 24 hours after presentation.
58. The study found that there were no statistically significant differences between the early and late groups in the length of stay, operative time, the percentage of advanced appendicitis, or the rate of complications. The study did not state what percentage of patients in either group underwent a ruptured appendix. It found that the percentage of patients in the early group developing (i) an abscess and (ii) a wound infection was 2 per cent and less than 1 per cent respectively. The percentage of patients in the late group developing one or other of those complications was in each case 1 per cent.
59. Dr Conn relied on the Earley and the Abou-Nukta studies to support his conclusion that in the case of Mr Williams the interval of 10 ¼ hours between presentation and surgery was an appropriate time frame for managing a patient with acute appendicitis who needs a CT scan.

### ***The Ditillo study***

60. The third study was carried out by Michael Ditillo and others from the Departments of Surgery and Pediatrics at Yale University School of

Medicine.<sup>4</sup> The objective of the study was to examine whether delayed surgical intervention in adult patients with acute appendicitis is safe by correlating the interval between onset of symptoms to operation (“the total interval”) with the degree of pathology and incidence of postoperative complications.

61. The study noted that prompt appendectomy had long been the standard of care for acute appendicitis because of the risk of progression to advanced pathology. However that time honoured practice had been recently challenged by studies in pediatric patients, which suggested that acute appendicitis could be managed in an elective manner once antibiotic therapy was initiated. No such data were available in adult patients with acute appendicitis.
62. The study involved a review of appendectomies that took place at the participating hospital between 1998 and 2004. During the study period, 1,081 appendectomies were performed.
63. The study concluded that in adult patients with acute appendicitis, the risk of developing advanced pathology and postoperative complications increased with time; therefore, delayed appendectomy was unsafe. As delays in seeking medical help were difficult to control, prompt appendectomy was mandatory.
64. The study found that when the total interval was less than 12 hours there was a 3 per cent risk of a patient developing perforation or phlegmon and a 3 per cent risk of a patient developing an abscess as a result of an inflamed appendix. Mr Williams would have fallen into this group.

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<sup>4</sup> Is It Safe to Delay Appendectomy in Adults With Acute Appendicitis? *Annals of Surgery*, Volume 244, Number 5, November 2006.

### *The Ingraham study*

65. The fourth study was carried out by Angela Ingraham and others from various medical institutions.<sup>5</sup> The objective of the study was to examine the effect of delay from surgical admission to induction of anaesthesia on outcomes after appendectomy for acute appendicitis in adults.
66. The study involved a review of data submitted to the American College of Surgeons National Surgical Quality Improvement Program database from 1<sup>st</sup> January 2005 to 31<sup>st</sup> December 2008.
67. Of 32,782 patients, 24,647 (75.2 per cent) underwent operations within 6 hours of surgical admission; 4,934 (15.1 per cent) underwent operations more than 6 through 12 hours, and 3,201 (9.8 per cent) underwent operations more than 12 hours, after surgical admission. I understand surgical admission to mean admission for surgery and not presentation at the ED.
68. The study concluded that delay of appendectomy for acute appendicitis in adults does not appear to adversely affect 30 day outcomes.
69. The outcomes in question were 30 day overall morbidity and 30 day mortality/serious morbidity. I understand “*morbidity*” to mean a diseased condition or state. “*Overall morbidity*” and “*serious morbidity*” were defined to include certain specified post-operative complications. Sepsis or septic shock was among the conditions included within serious morbidity.
70. The percentage of patients who died or developed serious morbidity was as follows: patients who underwent operations within 6 hours of surgical admission – 5.5 per cent; patients who underwent operations more than 6 through 12 hours after surgical admission – 5.4 per cent; and patients who underwent operations more than 12 hours after surgical admission – 6.1 per cent. Similar figures were obtained both when the severity of the appendicitis was taken into account and when it was not.

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<sup>5</sup> Effect of Delay to Operation on Outcomes in Adults With Acute Appendicitis. *Archives of Surgery*, Volume 145, Number 9, September 2010.



71. The authors noted various limitations of the study. For example the timing of an operation might depend on an assessment of its urgency: that would not be detected by the study.
72. An “*invited critique*” by Dr John Hunter of the Department of Surgery, Oregon Health & Science University, noted that, according to the study, the patients with a delay from surgical admission to operation greater than 12 hours fared no better and no worse than those who underwent appendectomy less than 6 hours from the time of surgical admission.
73. I understand Dr Conn’s point to be that by parity of reasoning, it is reasonable to conclude that a similar principle would apply with respect to the length of delay from presentation at the ED to operation. He also noted that Mr Williams was operated on within 6 hours of surgical admission.
74. When cross-examined, Dr Conn accepted that every patient should be treated on an individual basis. He agreed that it was important to proceed with expedition. It was appropriate to operate within 12 hours, but it would be better to operate sooner.
75. It was suggested to Dr Conn that the CT scan could have been carried out within 1¼ – 1½ hours of being ordered. He agreed that would be good and reasonable and that it would have been reasonable to obtain a report of the CT scan within another hour.
76. Dr Conn stated that he could not explain the interval of 1½ hours from the transmission of the CT scan to the overseas reporting agency at 17.27 to the time when the report was handed to Dr Di Lullo at 19.38. He stated that Mr Williams would probably have been in the operating room at least 1 hour earlier if the report had been delivered to Dr Di Lullo expeditiously.
77. However, Dr Conn did not accept that the relevant standard of care had not been met. Rather, he said that there were areas of timing which could be improved upon. He described the 4 hour time frame from the request for a CT scan to the operating theatre proposed by Dr Leitman as “*very aggressive*”. He also noted that if the result of the CT scan had been

obtained earlier the operating theatre would not necessarily have been free at the time, so the interval between surgical admission and surgery might have been greater.

78. Asked whether a RCA would necessarily set a standard of care, Dr Conn replied that it would not: its purpose was to identify certain action points although these might be used to develop standards.
79. Both Dr Leitman and Dr Conn referred to a study by Omar H Llaguna and others, including Dr Leitman, which was carried out at the Beth Israel Medical Centre.<sup>6</sup> This, it will be recalled, is the hospital where Dr Leitman worked. The purpose of the study was to determine whether or not the liberal use of CT in the work up of acute appendicitis results in a decreased negative appendectomy rate. The medical records of 940 consecutive patients who underwent emergency appendectomy between January 2002 and December 2006 were reviewed. The study concluded *inter alia* that the additional time spent obtaining a CT scan does not appear to increase the risk of perforation.
80. The CT scans in the study were immediately reviewed by a radiology resident and within 1 hour by a radiologist. The average time to complete a CT scan was 4.3 hours. The authors of the study did not know whether or not a CT scan was associated with increased emergency room work up times or longer times to surgery.

## **Whether Mr Williams has sustained any permanent injury**

### ***Cardiac injury***

81. Dr Zusman in his report stated that the development of myocardial ischemia during non-cardiac surgery is a known risk of abdominal surgical procedures and was affected by Mr Williams' peritonitis. He stated that sepsis is known

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<sup>6</sup> The Impact of the Liberal Use of CT in the Work Up of Acute Appendicitis. *The Open Surgery Journal*, 2009, 3.

to increase cardiac oxygen requirements and to potentially precipitate myocardial ischemia. This is consistent with the opinion of Dr Carl Levick, the cardiologist who treated Mr Williams after his operation. He stated that in his opinion Mr Williams' heart experienced a significant amount of stress caused by sepsis during the surgery.

82. Dr Zusman further stated that at the time of writing it was not possible to assess if Mr Williams had sustained any permanent cardiac injury or whether he had any disability. Further tests and information would be required to make such an assessment. However, Dr Zusman stated that based on the medical record provided to him he saw no evidence, despite the prolonged and complicated nature of Mr Williams' hospitalisation, that he had sustained any long term disability or harm. I did not understand Dr Leitman or Dr Conn to dissent from this assessment.

### ***Intestinal injury***

83. Dr Leitman noted that there were no medical records suggesting that Mr Williams had an abdominal condition prior to his appendicitis. He stated that it was typical for patients who had a ruptured appendix to develop intestinal adhesions. He accepted that such patients could still have trouble with their digestive tracts even if they were not operated on, or if they were and the operation was successful.

### **The law**

84. Those conducting a hospital are under a direct duty of care to those admitted as patients to the hospital. See X (Minors) v Bedfordshire County Council [1995] 2 AC 633 HL at 740, *per* Lord Browne-Wilkinson, with whom the other members of the House agreed. This includes a duty to set up a safe system of operation in relation to what are essentially management as opposed to clinical matters. See Robertson v Nottingham Health Authority [1997] 8 Med LR 1 CA at 13, *per* Brooke LJ.

85. Moreover, there is persuasive authority that English law (and by parity of reasoning Bermudian law) has reached the stage where a hospital generally owes a non-delegable duty to its patients to ensure that they are treated with skill and care regardless of the employment status of the person who is treating them. See Farraj v King's Healthcare NHS Trust [2010] 1 WLR 2139 at 88, *per* Dyson LJ, with whom the other members of the Court agreed.
86. As to the scope of that duty, a person will be negligent if he does not take steps to eliminate a risk which he knows or ought to know is a real risk and not a mere possibility which would never influence the mind of a reasonable person. However it is justifiable not to take steps to eliminate a real risk if it is small and the circumstances are such that a reasonable person, careful of the safety of his neighbour, would think it right to neglect it. See Wagonmound (No 2) [1967] 1 AC 617 PC at 642 F – 643 A, *per* Lord Reid.
87. However, where you get a situation which involves the use of some special skill or competence, eg the practice of medicine, then the test is the standard of the ordinary skilled practitioner exercising and professing to have that special skill. A practitioner need not possess the highest expert skill; it is well established law that it is sufficient if he exercises the ordinary skill of an ordinary competent practitioner exercising that particular art. See Bolam v Friern Hospital Management Committee [1957] 1 WLR 582 QB at 586, *per* McNair J.
88. Moreover, a medical practitioner is not guilty of negligence if he has acted in accordance with a practice accepted as proper by a responsible body of medical practitioners skilled in that particular art. Putting it the other way round, a practitioner is not negligent, if he is acting in accordance with such a practice, merely because there is a body of opinion who would take a contrary view. See Bolam v Friern Hospital Management Committee at 587, *per* McNair J, approved in Bolitho v City and Hackney HA [1998] AC 232 HL at 239 C – D.
89. However, the court is not bound to hold that a defendant doctor escapes liability for negligent treatment or diagnosis just because he leads evidence

from a number of medical experts who are genuinely of the opinion that the defendant's treatment or diagnosis accorded with sound medical practice. The court has to be satisfied that the exponents of the body of opinion relied upon can demonstrate that such opinion has a logical basis. In particular in cases involving, as they so often do, the weighing of risks against benefits, the judge before accepting a body of opinion as being responsible, reasonable or respectable, will need to be satisfied that, in forming their views, the experts have directed their minds to the question of comparative risks and benefits and have reached a defensible conclusion on the matter. See Bolitho v City and Hackney HA [1998] AC 232 HL at 241 G – 242 A, *per* Lord Browne-Wilkinson, with whom the other members of the House agreed.

90. The adequacy of hospital systems may involve both management and/or administrative matters on the one hand and medical matters on the other. In Bull v Devon Area Health Authority [1993] 4 Med LR 117 CA the Court of Appeal of England and Wales held that the adequacy of the staffing arrangements at a hospital in the 1970s must be judged according to the professional standards of that time, and not according to the standards of the 1990s. See page 20<sup>7</sup>, *per* Slade LJ, with whom Mustill LJ (as he then was) agreed.
91. On the other hand, in Collins v Mid-Western Health Board [2000] IR 154 SC the Irish Supreme Court held that the admissions system operated by the defendant hospital was not a medical practice as such, and that the allegation of negligence could not be refuted by showing that it was a universally approved professional practice. See 156 – 157, *per* Keane J; and 167, *per* Barron J. There is a tension between these authorities.
92. I think that the position is this. A hospital system must be scrutinised on its merits. If the system is a generally accepted practice in other hospitals, that is something that the court should take into account. Depending on the system in question, the court may need to take account of medical matters.

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<sup>7</sup> The page reference is for the LS Law Online Case Display version of the report.

Insofar as the court does so, the Bolam test will apply. Insofar as the court does not, the Bolam test will not apply. The distinction between medical and management/administrative matters may not always be easy to draw and the two may overlap.

## **Discussion**

### **Negligent breach of duty of care?**

93. The question is whether the BHB negligently breached its duty of care towards Mr Williams by failing to provide an adequate system for the diagnosis and treatment within a reasonable time of patients arriving in the ED with appendicitis.
94. I agree with Mr Pachai that an adequate system would be essentially a management or administrative matter rather than a medical one. However I also agree with Mr Doughty that when considering its adequacy regard must be had to medical matters. In particular, the question of how promptly a patient presenting with abdominal pain should be diagnosed and treated cannot sensibly be considered without reference to the state of medical knowledge on that topic.
95. I approach the studies cited earlier with caution. They do not purport to set a standard of care although I accept that they might be used to develop one. In particular, I am not persuaded that, in a case of acute abdominal pain, the mere fact that the time between presentation and surgery is no greater than 12 hours will in and of itself necessarily defeat a claim in negligence. Although it would be likely to defeat a delay based claim of *res ipsa loquitor*.
96. It is helpful to ask whether it is reasonably foreseeable that: (i) a patient presenting at the ER with abdominal pain might have appendicitis; (ii) if the appendicitis goes untreated the appendix might rupture; and (iii) if the

appendix ruptures the patient will develop harmful complications. I am satisfied that the answer to each of those questions is in the affirmative.

97. Then a further question arises: what is the risk that a patient with appendicitis will develop a ruptured appendix? This is a different question to whether the risk increases with delay. A risk that remains constant over a 12 – 24 hour period is still a risk.
98. The Ditillo study, with a study group of 1,081 patients, found that 3 per cent of the patients developed rupture or phlegmon within 12 hours of the onset of symptoms. This is a lower percentage than the 12.3 per cent of patients treated using the ACS model, or the 23.3 per cent of patients treated using the TRAD model, who developed a rupture in the Earley study. However the sizes of those study groups were only 167 patients and 127 patients respectively.
99. Neither the Abou-Nukta nor the Ingraham studies addressed the percentage of patients in their respective study groups who developed rupture. The sizes of the study groups were 309 patients and 32,782 patients respectively. However, I note that less than 1 per cent of patients in the Abou-Nukta study developed wound infections and 5.45 per cent of patients in the Ingraham studies developed post operative complications including sepsis and septic shock. I acknowledge the possibility that rupture may have contributed to these conditions.
100. Reviewing the various studies, I assess the risk that a patient with appendicitis will develop a ruptured appendix as being at least 1 per cent and probably nearer 3 per cent. An Adequate System would not assess that risk as being any lower.
101. A 1 per cent risk of serious harm is not inconsequential. For example, a reasonable person, knowing there was at least a 1 per cent risk that an aeroplane would crash, would probably choose not to fly on it. To take another example, suppose that: (i) an aeroplane on a long haul flight developed engine trouble while in mid-air; (ii) this gave rise to at least a 1 per cent risk that the plane would crash; and (iii) that risk would not increase

for the next 12 hours but remain constant. A reasonable pilot, knowing this, would not wait for the 12 hours to expire but would land his plane as soon as reasonably practicable.

102. Of course aeroplanes are not appendices. But the analogy does underline that, as Dr Conn stated, in matters of suspected appendicitis it is important to proceed with expedition.
103. In order to facilitate this, an Adequate System would provide that a CT scan in a case of suspected appendicitis should in the normal course of events be obtained on a STAT basis. An Adequate System would further provide that, where the CT scan was sent to an overseas reporting agency, the need for an interpretation on a STAT basis was communicated to the agency. It appears from the RCA that in May 2011 there were no such provisions in place at the Hospital. It is obvious to me that there should have been. I consider that this shortcoming was essentially administrative rather than medical. Had Mr Williams' CT scan been obtained on a STAT basis then it is probable he would have been diagnosed and treated more rapidly.
104. Dr Leitman considered that the interval from ordering a CT scan to surgery should have been no more than 4 hours. I find the fact that in the Llaguna study the average time to complete a CT scan at Dr Leitman's hospital was 4.3 hours of limited assistance. On the one hand, this finding provides a rational basis both for supporting and attacking Dr Leitman's opinion: 4.3 hours is close to 4 hours but slightly longer. On the other hand, I have no information as to how the levels of demand, staffing and resources at that hospital compare with those at the Hospital on the day in question.
105. A 4 hour timeframe may have been achievable, but I think that it is optimistic. The DI Department was busy that day. The fact that the RCA does not mention whether there were other CT scans that would have been required more urgently than Mr Williams' scan does not mean that there were none. The fact that the radiologist left early as he felt unwell may have prolonged matters. Had the CT scan been carried out and interpreted earlier, the wait for the operating theatre might have been longer.



106. Allowing for these “known unknowns”, I find that had the CT scan been ordered on a STAT basis, Mr Williams would probably have been operated upon within the next 5 or 6 hours. Thus, surgery would probably have commenced sometime between 17.15 (if there was a 5 hour interval and the CT scan was ordered at 12.15) and 19.10 (if there was a 6 hour interval and, as I consider more likely, the CT scan was ordered at 13.10).
107. It is not clear whether, if the CT scan had been ordered on a STAT basis, it would have been sent to the remote reporting agency for interpretation. If it had been sent to the agency on a STAT basis, then I think it probable that it would have been read and interpreted expeditiously. It is therefore unnecessary for me to decide whether the BHB had a non-delegable duty of care towards Mr Williams such that it would be liable for any negligent delay on the part of the remote reporting agency.
108. I conclude that the BHB did negligently breach its duty of care towards Mr Williams.

### **Causation?**

109. The question is whether the BHB’s breach of duty caused Mr Williams harm and consequential loss.
110. It is first necessary to determine at what time the appendix started to rupture. I find that the process began at around 15.19, based on the evidence of Mr Williams’ abnormally rapid pulse rate at that time. I accept Dr Leitman’s unchallenged evidence that he had seen patients who had presented in a similar way to Mr Williams who had developed a substantial amount of pus in a matter of hours. There was no other evidence that the appendix had started to rupture any earlier and the examinations carried out by Dr Okereke and the blood work suggested that it had not.
111. I therefore reject Dr Conn’s opinion that the presence of pus and phlegmon in the abdominal cavity showed that the appendix had started to rupture earlier. I was concerned that his estimate of when it started to rupture fluctuated in the course of his written and oral evidence. Indeed, at times,

his evidence seemed to imply that Mr Williams' appendix must have started to rupture before he felt any abdominal pain, which I consider most unlikely.

112. The next question is whether the failure to operate on Mr Williams within 5 or 6 hours after the CT scan was ordered caused him harm. To recap, his appendix started to rupture at around 15.19 and had the CT scan been ordered on a STAT basis he would probably have reached the operating theatre sometime between 17.15 and 19.10. In fact, anaesthetic was not administered until 21.30.
113. I accept Dr Levick's opinion that Mr Williams' heart experienced a significant amount of stress caused by sepsis during the surgery. From this I understand that the complications that Mr Williams experienced were probably the result of a combination of surgery and sepsis. Thus it would be too simplistic for me to find that, even if he had been operated upon earlier, Mr Williams would not have developed complications until after 21.30. I also accept Dr Zusman's evidence that sepsis is known to increase cardiac oxygen requirements and to potentially precipitate myocardial ischemia.
114. In the circumstances I find that the plaintiff has failed to prove that the complications that Mr Williams developed during and after surgery were probably caused by the BHB's failure to diagnose and treat him expeditiously. Had the CT scan been obtained and interpreted promptly these complications might have been avoided, but I am not satisfied that they probably would have been avoided.
115. That is not quite an end of the matter. I was struck by one of the comments in the "*discussion*" section of the paper on the Abou-Nukta study to the effect that one good reason for early operation in the case of appendicitis is to prevent pain and suffering, which is a doctor's ethical obligation to his patients. I agree. If the BHB had not breached its duty of care to Mr Williams the pain and discomfort that he experienced prior to the operation would have been shortened by several hours. To that limited extent, the BHB's negligence did cause Mr Williams harm. I propose to acknowledge this with a nominal award of damages for pain and suffering of \$2,000.00. The award is nominal because the period of pain and discomfort for which it

compensates Mr Williams was of short duration. But that does not mean that the additional pain and discomfort was inconsequential.

116. I conclude that the Plaintiff has not proved that the BHB's breach of duty caused the complications arising during and after surgery. However the BHB's breach of duty did cause Mr Williams several hours of additional pain and suffering, for which I award him damages of \$2,000.00. To that limited extent his claim is successful.
117. Interest will run on the damages at the rate of 3 ½ per cent from the date of issue of the writ until judgment. If either party wishes to persuade me otherwise they have liberty to apply.
118. At the conclusion of the hearing the parties invited me to order that costs should follow the event, which in light of this judgment means that the BHB will pay Mr Williams his costs, but with liberty to apply. I so order.

Dated this 9<sup>th</sup> day of January 2013 \_\_\_\_\_

Hellman J