REGULATION 28: REPORT TO PREVENT FUTURE DEATHS

	REGULATION 28 REPORT TO PREVENT FUTURE DEATHS **THIS REPORT IS BEING SENT TO:** 1. Alex Whitfield Chief Executive Hampshire Hospitals NHS Foundation Trust Royal Hampshire County Hospital, Romsey Road Winchester, Hampshire, SO22 5DG 2. [redacted] Park & St Francis Surgery Hursley Road, Chandlers Ford, Eastleigh, HantsSO53 2ZH
1	**CORONER** I am Karen Harrold, Assistant Coroner for the coroner area of Central Hampshire.
2	**CORONER'S LEGAL POWERS** I make this report under paragraph 7, Schedule 5, of the Coroners and Justice Act 2009 and regulations 28 and 29 of the Coroners (Investigations) Regulations 2013. http://www.legislation.gov.uk/ukpga/2009/25/schedule/5 http://www.legislation.gov.uk/uksi/2013/1629/made
3	**INVESTIGATION and INQUEST** On 19th June 2017, the Senior Coroner, Grahame Short, commenced an investigation into the death of Joan Elizabeth Betteridge aged 88 years old. The investigation concluded at the end of the inquest on 13th December 2017. I recorded a Narrative Conclusion as follows: Joan Elizabeth Betteridge had a history of falls including the 31st May 2017. She was admitted to the Royal Hampshire County Hospital in Winchester on 9th June 2017. An X-ray confirmed a displaced fractured neck of left femur requiring surgery namely cemented hemiarthroplasty which took place on 10th June. Mrs Betteridge remained stable for 50-55 minutes into the operation and 3 minutes after cement insertion she developed a slow heart rate which despite immediate treatment resulted in her death. The post mortem confirmed the cause of death was bone cement implantation syndrome, a recognised complication of this type of operation. The medical cause of death was recorded as: 1a) Bone cement implantation syndrome; 2) Ischaemic heart disease.

4	**CIRCUMSTANCES OF THE DEATH** Joan Betteridge was an 88 year old lady who lived independently with her husband [redacted] in their privately owned apartment at Brendoncare Knightwood – the Mews. Mrs Betteridge had a diagnosis of Parkinson's disease and mild COPD which required her to use inhalers on a daily basis. The autopsy also noted ischaemic heart disease with severe coronary artery atheroma plus some mild ventricular hypertrophy and an old myocardial infarction. Her daughters told me that the Parkinson's meant she was often unsteady on her feet which caused her much frustration when she felt it limited her mobility. This meant that she had a history of falls. In the days leading up to her death, Mrs Betteridge suffered a series of falls for a variety of reasons. On 29 May 2017, she lost her balance and fell to the floor landing on her hip. She was taken to the Royal Hampshire County hospital (RHCH) by ambulance and was admitted overnight for observation. Although there was bruising over the left hip, an X-ray confirmed there was no fracture so she was released home on 30th May with pain relief medication. The hospital also arranged for a physiotherapist from the Enhanced Recovery Team to support her at home with a six week package of care. The following day on 31st May at 03:00 hrs Mrs Betteridge was found on the floor in the lounge at home having sustained a large wound on the back of her head. She could not recall how she fell or injured herself. Once again, she was taken to the same hospital by ambulance at 05:37 hrs and a further X-ray was taken at 08:45. During the inquest, I read from a report prepared by Dr Chan, the ED Clinical Director, and she confirmed that the X-ray was reviewed by a junior doctor in the ED at 09:00 and she detected no abnormality but also discussed her findings with the middle grade doctor on duty, who agreed the findings. Mrs Betteridge was discharged from the ED department after 3½ hours and returned home. The following day she was assessed by an experienced physiotherapist who was concerned about the difficulties in weight bearing, the degree of pain experienced and degree of functional decline so he contacted the GP surgery to suggest re-admitting to hospital for further X-ray. The GP made a house call the same afternoon and after a clinical examination pain in the upper left leg and groin was noted which was aggravated by abduction of the hip but external and internal rotation was painless and there was no shortening of the leg, both classic signs of a possible fracture. The doctor therefore concluded that the picture did not suggest there was a fracture but indicated her intention to request a repeat X-ray and Co-codamol pain relief was prescribed. On 2 June there was another fall and she was seen by Dr Rickenbach of the Park Surgery due to mobility difficulties. On examination he noted that she was well and alert and able to stand unaided and transfer to a commode. He discussed the situation with the lead carer and family as he felt it was unlikely she would be accepted for admission given the previous history involving two recent admissions and two X-rays confirming no abnormalities were detected. As a result, he felt a move to a nursing home was a better option than back to hospital as the weekend was approaching. This took place on 3 June but there was a further fall the same day and also on 4th June. By 6th June Mrs Betteridge had developed fluctuating levels of confusion so the nursing staff contacted Mrs Betteridge's GP surgery and requested a review as she still had persistent pain. This was refused as the nursing home was in a different catchment area. On 7th June the fluctuating episodes of confusion persisted and it was noted that despite regular analgesia for pain this was not working. [redacted] visited again and was unhappy with the lack of progress and concerned about the continuing pain in the left hip. This prompted him talk to Mrs Betteridge's GP, [redacted], as he was concerned that another x-ray had not been progressed and it was needed to exclude a fracture elsewhere. [redacted] confirmed a further request for an X-ray was made on 7 June. He also indicated that surgery records confirmed a request had also been made on 1 June but he could not explain what proactive steps were taken to monitor

and ensure the request was chased up if there was an apparent delay.

On 8th June Mrs Betteridge was temporarily registered with the Twyford surgery and [redacted] visited following a request from one of the registered nurses due to increasing pain on mobility. The GP noted that Mrs Betteridge was comfortable sitting in a chair. He noted there was no tenderness to left leg, knee or ankle and no pain on flexion of hip or rotation or on compression of pelvis. The plan was to continue analgesia and increase if required. He also wanted to chase the details of the ED attendance and previous x-ray results as few details were known but also request a further X-ray at the hospital fracture clinic the next day.

On 9/6/17 Mrs Betteridge was readmitted via ED and an x-ray revealed there was a displaced fractured neck of left femur which required surgery, namely left cemented hemiarthroplasty. Overnight there was another fall out of bed. Surgery went ahead as planned on 10th June following a surgical and anaesthetic review. During preparations she was observed as stable. Her blood pressure was regularly monitored and all the signs were that she was cardiovascularly stable so surgery started at 15:20. She remained stable with a good blood pressure for a period of about 50-55 minutes.

The surgeon prepared to fill the femoral canal with cement and thumb pressure applied when the prosthetic stem was inserted. Whilst waiting for the cement to set, Mrs Betteridge arrested. As mentioned already, she remained stable until 3 minutes after cement insertion when she developed bradycardia. A consultant anaesthetist and intensivist attended quickly (having been called from the adjacent ward) and sadly despite immediate treatment with appropriate medication she eventually reached the point where a decision was made not to continue with resuscitation efforts in view of likely poor outcome and poor prospects of CPR being successful. She was pronounced dead at 16:19.

The pathologist, [redacted], confirmed cause of death was due to bone cement implantation syndrome as the post mortem histology showed the presence of bone marrow emboli within the blood vessels of the lung. In addition he felt a contributory factor may have been played by his findings that there was evidence of ischaemic heart disease including some degree of hypertrophy; an old myocardial infarction and narrowing of the coronary arteries.

He confirmed that bone cement is an acrylic substance used to secure implants to bone or to fill joint cavity and that bone cement implantation syndrome is now well recognised as an established complication although there is no widely accepted definition of its cause. When it occurs it can range from a mild form like transient hypoxemia to a fatal form including death.

The incidence of BCIS varies widely in the literature and fatalities have been rare. The cause and processes involve are not completely understood but various theories have been proposed including:

- The release of substances out of the cement itself and entering into the blood circulation then travelling to heart of lungs;
- Bone marrow also entering the blood and forming emboli which can travel to other organs such as the lungs and heart;
- Or debris from washing out the canal again causing emboli in the heart or lungs;
- Or it could be a combination of all three factors.

He did confirm that the literature confirms that it is a rare complication and death only occurs in approximately 0.1-0.4% of cases. In Mrs Betteridge's case given her degree of heart disease she would not have had the reserve to cope.

After Mrs Betteridge's death, a subsequent review of the X-ray taken on 31st May revealed there was, in fact, an undisplaced fracture. [redacted] also confirmed that normally there is a safety net in place, where radiologists review x-rays after they have

	been initially interpreted in the emergency department and that often this is after the discharge of the patient. These are usually reported within a couple of days. Those reports are then reviewed by the emergency medicine consultant. Where there is a missed fracture the consultant will contact the patient to advise them of the diagnosis. In some cases the treatment does not need to change but in more serious cases where the patient needs further treatment they are recalled. In this case that review was not completed until 12 June – two days after Mrs Betteridge's death.
5	**CORONER'S CONCERNS** During the course of the inquest the evidence revealed matters giving rise to concern. In my opinion there is a risk that future deaths will occur unless action is taken. In the circumstances it is my statutory duty to report to you. The MATTERS OF CONCERN are as follows:- **1) Park & St Francis Surgeries to review the system used to request X-rays and potentially other basic tests.** I heard evidence that [redacted] intended to request a repeat X-ray on 1 June but nothing happened until the physiotherapist queried progress with a different GP in the same surgery. This raises concerns either that the request was not made or if it was made then it was not progressed in a timely fashion. A further request was made on 7 June and took place on 9 June, two days later. **2) Trust to expore potential IT changes to automatically capture an Xray request made by an ED doctor.** I heard from [redacted], Director of Surgical Services, that many changes have been made to date and some are still ongoing such as planned future audits. He also confirmed that when an acute patient like Mrs Betteridge is discharged from ED back home for coumminty care, the radiology review is the fall back system. Priority is given to ED and GP referrals and the reason there was a delay in this case from 31 May until 12 June was that the request for a review was registered as an inpatient referral not an ED referral. Why that happened was not known but clearly Mrs Betteridge was never an inpatient on 31 May.
6	**ACTION SHOULD BE TAKEN** In my opinion action should be taken to prevent future deaths and I believe you have the power to take such action.
7	**YOUR RESPONSE** You are under a duty to respond to this report within 56 days of the date of this report, namely by 23rd March 2018 I, the coroner, may extend the period. Your response must contain details of action taken or proposed to be taken, setting out the timetable for action. Otherwise you must explain why no action is proposed.
8	**COPIES and PUBLICATION** I have sent a copy of my report to the Chief Coroner and to the family of Joan Elizabeth Betteridge. In addition, I have also sent it to: 1) [redacted], Medical Director Surgical Services I am also under a duty to send the Chief Coroner a copy of your response.

	The Chief Coroner may publish either or both in a complete or redacted or summary form. He may send a copy of this report to any person who he believes may find it useful or of interest. You may make representations to me, the coroner, at the time of your response, about the release or the publication of your response by the Chief Coroner.
9	**Date: 26th January 2018** Karen Harrold Assistant Coroner Central Hampshire