	THIS REPORT IS BEING SENT TO: **1 [redacted], Chief Executive U. Hospitals Sussex NHS Foundation Trust** **2 [redacted], Medical Director, St Richards Hospital, Chichester** **3 Chief Executive NHS England** **4 Chief Executive Health Education England** **5 Chief Executive CQC**
1	CORONER Dr Karen Henderson, HM Assistant Coroner for West Sussex
2	CORONER'S LEGAL POWERS I make this report under paragraph 7(1) of Schedule 5 to The Coroners and Justice Act 2009.
3	INVESTIGATION and INQUEST On 7th January 2022 I resumed an investigation into the death of Teegan Marie Barnard. On 14th December 2022 I concluded the Investigation. The medical cause of death given was: 1a. Acute Bronchopneumonia 1b. Global Cerebral Hypoxia 1c. In Hospital Cardiac Arrest following Third Trimester Lower Segment Caesarean Section, Significant Post-Partum Haemorrhage and Perioperative Bilateral Tension Pneumothoraces I determined: On 7th October 2019 Teegan Marie Barnard died at her home address in Havant. She sustained an irrecoverable hypoxic brain injury following a prolonged pulseless electrical activity (PEA) cardiac arrest during emergence from a general anaesthetic after an emergency lower segment caesarean section (LSCS) on 9th September 2019 at St Richards Hospital, Chichester. The PEA cardiac arrest was due to bilateral tension pneumothoraces, the cause of which remains unclear, but in circumstances whereby a delay in the recognition and treatment thereof made a material contribution to Teegan's death.
	CIRCUMSTANCES OF THE DEATH Teegan became pregnant in December 2018 and was admitted in the early stages of labour to the delivery suite at St Richard's Hospital, Chichester on 8th September 2019. Labour did not progress and a category 2 LSCS

	was undertaken at or around 0300 on 9th September 2019 by way of general anaesthesia as the spinal anaesthetic was ineffective. At LSCS, Teegan was found to have had an obstructed pregnancy with an atonic uterus, sustaining a significant post-partum haemorrhage of approximately four litres. This was treated with pharmacological and surgical interventions. The surgery was concluded at or around 0430 hours. Teegan was clinically stable with all physiological parameters, including airway pressures, within normal limits. A decision was made to awaken Teegan from the anaesthetic. This included reversal of neuromuscular blockade, with transfer to ventilator pressure support mode with delivery of 100 % oxygen. At or around 0500 hours, Teegan remained intubated and had been transferred from the operating table onto her bed. After transfer and on turning Teegan to be cleaned, the ventilator high airway pressure alarm sounded, and Teegan's oxygen saturation fell. Attempts to ventilate Teegan by the ventilator or by hand and with a separate breathing circuit were not successful. She was deeply cyanotic and had begun to swell, at first in and around her head and neck and thereafter throughout her whole body. No breath sounds were heard on auscultation and despite strenuous attempts at ventilation, her chest was not moving. Shortly thereafter, at or around 0510-0515 hours, Teegan had a pulseless electrical activity (PEA) cardiac arrest. Teegan was thought to have developed anaphylaxis for which treatment was given but without resolution or improvement in her clinical condition. At or around 0545 with the enduring PEA cardiac arrest, an ongoing inability to ventilate by any means possible, and the continuing absence of chest movement and breath sounds on auscultation, the whole-body swelling was recognised to be due to surgical emphysema from a presumptive diagnosis of bilateral tension pneumothoraces. At or around 0548 hours bilateral thoracostomies were undertaken with return of spontaneous circulation. Unfortunately, given the length of time of the cardiac arrest, Teegan sustained a non-survivable hypoxic brain injury and sadly died at home six weeks later, on 7th October 2019. She was 17 years of age at the time of her death.
5	CORONER'S CONCERNS **1. Resuscitation algorithm (4 H's & 4 T's)* for PEA cardiac arrest** I heard evidence that the 4 H's and 4 T's should be considered and excluded in any PEA cardiac arrest situation. Steps were taken to treat anaphylaxis, but in the absence of any improvement in Teegan's clinical

condition, and whilst it was mentioned, no steps were taken to exclude possible bilateral tension pneumothoraces. Evidence was heard at the Inquest that it is the only one of the 4 H's and 4 T's (see footnote) that directly results in a sudden inability to ventilate, with the HSIB report indicating that there was sufficient time to consider and exclude this possibility given the length of time of the PEA cardiac arrest.

2. Surgical emphysema

There was a delay in the recognition of surgical emphysema by clinical attendees at the cardiac arrest (medical specialist registrar, consultant obstetricians, anaesthetic core trainee, anaesthetic specialist registrar and the on call consultant anaesthetist) despite indicative clinical signs of deep cyanosis, gross whole body swelling with the need to remove the increasingly constrictive hospital wrist band and endotracheal tube tie, alongside sub-cutaneous crepitus and an abdominal drainage bag noted to be tense with air.

3. Investigation after Teegan's death

Following this incident, and despite Teegan being intubated and ventilated at the time, with a real possibility of this being an anaesthetic related event, no steps were taken by the anaesthetic department at St Richard's Hospital, Chichester, either before or after the publication of the HSIB report, to explore potential iatrogenic or other anaesthetic related causes (such as exposure of Teegan's lungs to excessive volume or pressure) as a possible or probable cause of Teegan's death.

Furthermore, the anaesthetic machine/ventilator was not taken out of service and assessed to see if there was a fault. Neither was the data from the anaesthetic machine downloaded and interrogated, which may have assisted in establishing how Teegan came to develop bilateral tension pneumothoraces during her emergence from general anaesthesia.

The failure of the anaesthetic department to undertake any morbidity or mortality review/meeting following Teegan's death led to a lost opportunity to share any possible learning opportunities both within and outside their department to prevent future deaths, and as a corollary to have been in a position to fully assist both the investigation by the HSIB and the inquest hearing.

4. Trust Clinical Governance procedures

The senior management team within the Trust have not acknowledged that there was a lack of a proper and robust system in place to trigger an investigation into all the circumstances of the death of a 17-year-old

	patient, with no steps taken by them to do so either before or after the publication of the HSIB report or at any time prior to the Inquest hearing. This gives rise to a concern of a lack of insight within the senior management team of the importance of undertaking a comprehensive investigation into unexpected deaths within their organisation and for there to be wider dissemination of any institutional learning with the aim of preventing future deaths. The failure of the Trust to fully investigate how Teegan came by her death also gives rise to a concern regarding the Trust's obligation to comply with the Statutory Duty of Candour and their requirement to share their findings with both the regulators and Teegan's family as well as to indicate the steps, if any, they have taken to prevent future deaths. ***: 4 H's:** Hypothermia, Hypoxia, Hypovolaemia, Hypo/Hyperkalaemia ***: 4 T's: Tension pneumothorax**, Toxins, Thrombosis, Tamponade
6	ACTION SHOULD BE TAKEN In my opinion action should be taken to prevent future deaths and I believe that the people listed in paragraph 1 have the power to take such action.
7	YOUR RESPONSE You are under a duty to respond to this report within 56 days of its date; I may extend that period on request. Your response must contain details of action taken or proposed to be taken, setting out the timetable for such action. Otherwise, you must explain why no action is proposed.
8	COPIES I have sent a copy of this report to the following: 1. See names in paragraph 1 above 2. [redacted] (mother of Teegan Marie Barnard 3. Clinical Director, Anaesthetics, St Richards Hospital, Chichester 4. [redacted] ex- CEO, UHS NHS Foundation Trust 5. Chairman, Board of Governors, UHS NHS Foundation Trust 6. President, Royal College of Anaesthetists 7. President, Association of Anaesthetists Great Britain and Ireland 8. General Medical Council 9. HSIB In addition to this report, I am 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 at the time of your response, about the release or the publication of your response by the Chief Coroner.
	Signed:  Dr Karen Henderson DATED this 17th Day of January 2023