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How the 2024–25 Bird Flu Outbreak Disrupted Our Food Supply and Challenged Health Systems

Dibash Kumar Das, PhD

Steven L. Shafer, MD, FASA, *Editor-in-Chief*

In early 2025, a quiet poultry farm in Noxubee County, Mississippi, became the flashpoint for a mounting crisis (asamonitor.pub/42J6V6j). Nearly 48,000 chickens were culled following the first confirmed outbreak of H7N9 bird flu in the United States since 2017. The news arrived as the nation was already reeling from the broader devastation caused by H5N1 avian influenza – a strain that has decimated livestock, strained food systems, and crossed species boundaries in alarming ways (asamonitor.pub/42J6V6j).

The 2024-25 bird flu outbreak, one of the most disruptive in recent memory, is more than a veterinary event – it is a One Health crisis with ripple effects across human medicine, animal welfare, agriculture, and public policy (asamonitor.pub/42ybmBH). For health care practitioners, the consequences are no longer confined to farms. With confirmed human infections, rising food insecurity, and zoonotic crossover into mammals, this is a moment for heightened awareness and interprofessional action.

A national crisis

By late March 2025, H5N1 had infected more than 168 million poultry throughout 51 U.S. jurisdictions, affected 990 dairy herds in 17 states, and appeared in over 12,700 wild birds (asamonitor.pub/3EeYB5P). These figures point to the largest documented spread of highly pathogenic avian influenza across multiple species in the U.S. (asamonitor.pub/3EeYB5P).

The H7N9 strain, although less widespread, carries a particularly high

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Top 10 Reasons to Attend ANESTHESIOLOGY® 2025

Linda Shore-Lesserson, MD, FAHA, FASE, FASA

Gathering in lovely, historic San Antonio, Texas, with thousands of your fellow anesthesiologists to advance the specialty we're all dedicated to, is its own reward. The knowledge to be gained, and the connections to be made, are immeasurable. Although we can't count the

many valuable moments in store for us, we can zoom in on the top 10 reasons ANESTHESIOLOGY® 2025 is a can't-miss event for anesthesiologists at every career stage. From medical students to retirees, these career-enhancing benefits

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EXIT Procedure Uses Mother As Life-Support System During Newborn's Heart Surgery

Pamela Schumacher, MS, CCMP

Surgeons performing an exutero intrapartum treatment (EXIT) used a mother as a life-support system to keep her baby alive during a landmark, lifesaving open-heart surgery. The procedure, conducted in January 2025 at WMCHHealth's Maria Fareri Children's Hospital, Valhalla, New York, employed a team of more than 20 medical specialists to complete the delicate operation minutes before

the baby was fully delivered. The result made history. It is the first EXIT procedure to open atrial septectomy-to-rapid stage I Norwood palliation in a neonate with hypoplastic left heart syndrome and intact atrial septum, says Alexander Mittnacht, MD, FASE, Vice Chair of Anesthesiology and Chief of Pediatric and Adult Cardiac Anesthesia, Westchester Medical Center (WMC).

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SPECIAL SECTION

Advances in Transfusion Medicine and Patient Blood Management

Guest Editor: Nicole R. Guinn, MD, MBA

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From the Front Lines: EXIT Procedure

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Rare, but not unheard of

The EXIT procedure is a staged or modified cesarean birth in which the fetus is partially delivered from the uterus to secure the airway or vascular access for extracorporeal membrane oxygenation (ECMO), while respiratory gas exchange is maintained via uteroplacental circulation (*J Clin Anesth* 2016;31:60-3). The first EXIT procedure successfully performed in the United States took place at the Thomas Jefferson University Hospital in 1990. Since then, the procedure has been used to safely deliver fetuses with antenatally diagnosed airway compromise or complex congenital heart disease (CHD). The procedure gives surgeons the time to intervene surgically and stabilize the baby before the umbilical cord is cut (StatPearls. 2025).

“For the uterine incision part, a hemostatic hysterotomy is necessary, which means opening the uterus and preventing uterine bleeding at the same time. The baby is partially or fully delivered, depending on the intervention required, but remains attached to the placenta via the umbilical cord.”



EXIT Anesthesia Team: Bianca-Nandini Jambhekar, MD (Anesthesia Resident); Bhupen Mehta, MD (Pediatric Cardiac Anesthesiologist); Julio Gonzalez (Anesthesia Technician); Alexander Mittnacht, MD (Chief, Cardiac Anesthesia, Adult and Pediatric Cardiac Anesthesiologist); Sangeeta Kumaraswami, MD (Chief, Obstetric Anesthesia, Obstetric Anesthesiologist); Kar-Mei Chan, MD (Pediatric Cardiac Anesthesiologist); Westchester Medical Center, WMCHealth, Valhalla, NY.

left heart syndrome with intact atrial septum, a rare congenital heart defect that results in an underdeveloped left side of the heart. The defect leads to high mortality rates immediately after birth, as the baby's underdeveloped heart cannot pump oxygen-rich blood into the body. Surgery to address this defect typically involves three stages, the first of which is performed in the first week of life. Most babies with this condition can survive after birth until their first surgery. However, Ms. Wild's baby had no communication between the right and left sides of the heart, which created additional challenges and an extremely elevated risk of death for the baby if she had a standard delivery.

“The EXIT procedure was scheduled as part of a cesarean section and involved

partially delivering the baby through an incision in the uterus and addressing an otherwise life-threatening condition (open atrial septostomy, or OAS) while the baby was still attached to the placenta. The fetal circulation and placental support were still intact, so the placenta acted as a ‘life support system.’ If the baby were delivered without the EXIT procedure, it would have taken too long to place him on a heart-lung machine, and that would have been life-threatening or fatal for the baby,” says Dr. Mittnacht.

Not your mother's C-section

While the surgery starts in a similar fashion to a typical cesarean section, it has its own challenges. “First, the obstetric anesthesiology team anesthetizes the

patient. It's possible to use either neuraxial or general anesthesia. In this case, we used general anesthesia,” says Sangeeta Kumaraswami MD, Chief of Obstetric Anesthesia at WMC, and the obstetric anesthesiologist on the case. “The obstetric team then starts the surgery like a cesarean section and partially or fully delivers the baby. The rest of the baby's body remains inside the uterus with the umbilical cord still attached to the placenta. In our case, the baby was almost fully delivered.

Keeping the lower part of the body of the baby within the amniotic cavity helps to maintain uterine volume and prevent rapid temperature loss. Maintaining uterine volume is important for preventing premature contractions and delivery of the placenta, which would abort the procedure. A continuous infusion of crystalloid solution may be instilled into the uterine cavity to prevent intraoperative fluid loss, which would also prevent premature placental separation, shares Dr. Kumaraswami.

“This surgery has very different goals than a regular cesarean section,” Dr. Kumaraswami continued. “For the uterine incision part, a hemostatic hysterotomy is necessary, which means opening the uterus and preventing uterine bleeding at the same time. The baby is partially or fully delivered, depending on the intervention required, but remains attached to the placenta via the umbilical cord. The goal is to relax the uterus until the EXIT procedure is completed, which is different from a traditional cesarean section. After completing the EXIT procedure, the baby is delivered, and the cesarean section is completed. Additionally, the staffing ratio differs. While a traditional cesarean section only requires one anesthesia team, for an EXIT procedure, two teams – one for the mother and one for the newborn – are needed.”

After the partial delivery, a non-obstetric subspecialty surgeon then addresses the life-threatening condition, recalls Dr. Mittnacht. “In our case, the intervention was performed by pediatric cardiac surgeons and included a midline sternotomy and left atrial septectomy to allow for transition from fetal to neonatal circulation. Once the baby's condition was stabilized, the umbilical cord was cut, and the baby was fully delivered. Then, the baby was transferred to the NICU while the cesarean section was completed.”

The extent of multidisciplinary coordination between several surgical and nonsurgical specialties is typically not seen with most other surgeries, says Dr. Mittnacht. Specialists might include pediatric ENT surgeons, pediatric cardiothoracic surgeons, pediatric cardiologists, obstetric and pediatric anesthesiologists, neonatologists, and pediatric intensivists.

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Anesthetic Concerns for EXIT Procedures

- Preserving uteroplacental perfusion and gaseous exchange. It is key to maintain maternal blood pressure and heart rate, left lateral uterine displacement, normocarbica and normothermia, and uterine volume.
- Achieving adequate uterine relaxation before the hysterotomy or uterine incision. Keeping the uterus relaxed is essential for providing optimal conditions for the completion of the EXIT procedure.
- Monitoring the fetus and administering medications directly to the fetus either by intramuscular or intravenous route. Current neuroscientific evidence shows that fetuses may feel pain as early as 12 weeks gestation. Some of the medications and anesthetic agents administered to the mother would also cross the placenta and contribute to fetal anesthesia.
- Preparing for maternal hemorrhage by having blood available for transfusion and adequate large-bore intravenous access.
- Promptly treating uterine hemorrhage. The use of uterotonic drugs and promptly treating postpartum hemorrhage are essential.
- Fetal heart rate and oxygenation, and pulse oximetry monitoring on the upper extremity of the baby should be established, if possible (*Paediatr Anaesth* 2021;312:275-81).

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From the Front Lines: EXIT Procedure*Continued from page 7***Risks and anesthesia considerations**

Once an EXIT procedure is underway, the major risk to the mother is uterine hemorrhage because of the necessity for prolonged uterine relaxation, larger hysterotomy, and higher likelihood of placental abruption and laceration. In fact, there's an average estimated blood loss of >1 L following EXIT procedures, with 6% of mothers requiring blood transfusion (*Semin Pediatr Surg* 2019;28:150820).

Avoiding premature labor under all circumstances was the ultimate goal, says Dr. Kumaraswami. "An EXIT procedure is logistically too complex to be performed as an emergency. It is crucial for the obstetric team to closely monitor the pregnancy and keep the entire EXIT team informed of any developments. During the case, the obstetric anesthesiologist must be prepared for hypotension caused by blood loss, general anesthesia, and the uterine relaxants required until the EXIT procedure is completed. Close communication with the obstetric team during the C-section to help facilitate optimal

surgical conditions, such as uterine relaxation, is important.

"For the obstetric anesthesia part, my plan was placement of a high lumbar epidural catheter, followed by placement of large-bore peripheral intravenous cannula, radial artery cannulation for continuous intraoperative blood pressure monitoring, and then general anesthesia for the procedure," says Dr. Kumaraswami. The team placed the epidural catheter and large-bore peripheral intravenous cannula in the labor and delivery unit before bringing the patient to the operating room.

"Regarding the anesthetic management of the partially delivered baby during an EXIT procedure, only a few case reports are available," notes Dr. Mittnacht. "In general, although some of the medications used for the mother will cross the placenta and anesthetize the baby, the interventionalists/surgeons typically request a completely motionless baby, meaning full muscle paralysis. Since establishing a peripheral I.V. would delay the actual intervention, administering an intramuscular hypnotic agent, a parasympatholytic drug, and a muscle relaxant is recommended to supplement the inhalational anesthetic that crosses the placenta. In our case, we administered

ketamine, atropine, and rocuronium mixed and injected it into the baby's thigh."

Planning makes perfect

Although preparation took weeks, the surgery itself was over relatively quickly. The EXIT procedure took about 30 minutes, from partial delivery of the baby to clamping of the umbilical cord. However, the actual surgery on the baby only took about 90 seconds. Dr. Mittnacht recalls, "After the septectomy was performed, the baby was intubated endotracheally and was fully delivered. Then, the umbilical cord was clamped and cut, and that was the end of the EXIT procedure. The baby was immediately taken to an adjacent OR where he was further stabilized, invasive lines were placed, and sternotomy closed. The baby was transported to the pediatric ICU. For the mother, the cesarean section continued, and after successful completion, we transferred her to the PACU."

He credits the surgery's success to the team's expertise and the extensive multidisciplinary planning that began almost a month before the procedure. "We had two adjacent ORs earmarked for the procedure, one where the surgery would start and the EXIT procedure would happen, and the

other where the baby would be taken after the EXIT procedure and delivery. We had two simulation sessions in the two weeks leading to the procedure and a team meeting and review of the room set up on the morning of the procedure. Every step, from what equipment was needed to where everyone would be standing and where exactly the baby was positioned, was practiced with all the members of the EXIT team. I was pleased at how seamlessly everything went. As the obstetric anesthesiologist for the procedure, it was very fulfilling."

Miracle baby

Ms. Wild's baby, Luciano Reynaga III, was born nearly full-term at 38 weeks, weighing 8 lbs. and 1 oz. Surgeons completed a second surgery that rebuilt his aorta and converted his right ventricle into a pumping chamber (Norwood procedure) less than 24 hours later. After an uneventful postoperative stay in Maria Fareri Children's Hospital's pediatric intensive care unit, Luciano recovered at a children's rehabilitation facility and is now at home. He will need additional follow-up heart surgeries to achieve normal oxygen saturation but is expected to have a good quality of life. ■