Paralyzed by Mistakes, Part 1
Preventing Errors with Neuromuscular Blocking Agents
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Neuromuscular blocking agents have inadvertently been given to patients who were not receiving proper ventilator assistance. Because the patient’s respiratory muscles were paralyzed, some patients have died or sustained serious, permanent injuries. In fact, our Medication Errors Reporting Program at the Institute for Safe Medication Practices (ISMP) has received well over 50 reports concerning misuse of these agents over the past several years. Unfortunately, the true incidence of injuries from the accidental administration of neuromuscular blocking agents is probably much higher than that reflected in error reports.

Although some errors have occurred in the operating room (OR), most of these mishaps have taken place in emergency departments (EDs), interventional radiology departments, intensive-care units (ICUs), and other medical, surgical, and psychiatric units. Many errors can be attributed to one or more common root causes.

Part 1 of this two-part series presents some examples of such errors.

LOOK-ALIKE PACKAGING AND LABELING OF PRODUCTS

Nurses have mistakenly reconstituted measles and bacille Calmette-Guérin (BCG) vaccines with pancuronium and have administered these vaccines to healthy infants. One infant died after experiencing seizures and respiratory arrest. The pancuronium vial was similar in appearance to a vial of the correct diluent, sodium chloride injection.

A nurse in the ED gave pancuronium instead of influenza vaccine to several patients. The vials were the same size, and the labels were similar. The look-alike vials had been stored next to each other in the refrigerator. The patients experienced dyspnea and respiratory depression but, fortunately, sustained no permanent injuries.

An adult patient received cisatracurium that was intended for an infant on mechanical ventilation. The cisatracurium infusion, along with three bags of antibiotics, had been delivered by accident to a medical unit. A nurse verified that the first three bags in the stacked pile of piggyback medications were the prescribed antibiotics, but she was interrupted before she was able to check the fourth bag, which contained cisatracurium. Returning to the medication room, the nurse glanced at the yellow label, which was similar to other labels on the antibiotics, and she administered the neuromuscular blocking agent, believing it was an antibiotic. The patient experienced respiratory arrest and required ventilation for several hours.

LOOK-ALIKE DRUG NAMES

A physician prescribed intravenous (IV) vancomycin 1.5 g every 12 hours, which the nurse transcribed correctly onto the medication administration record (MAR). However, the pharmacist misread the faxed copy of the handwritten order and entered vecuronium into the pharmacy computer. A technician prepared the 1.5-g dose in 250 mL using 15 vials (100 mg/10 mL) of vecuronium. The checking pharmacist did not recognize the error, and the bag was dispensed to the unit. Fortunately, the technician had affixed a vivid alert sticker stating NEUROMUSCULAR BLOCKER, PATIENT MUST BE INTUBATED to the bag. The nurse noticed the sticker, thereby averting a serious medication error.

DRUG ADMINISTRATION AFTER EXTUBATION

A patient receiving mechanical ventilation in the ICU was receiving vecuronium and a potassium chloride infusion. After the patient was extubated, vecuronium was discontinued. An infusion bag containing vecuronium remained in the room and was mistakenly identified as a potassium chloride infusion. Soon after the medication was started, the patient went into cardiac arrest and required intubation and ventilation for six hours.

UNLABELED SYRINGES

In one report that we received, commercially prepared saline flush syringes were not available in the ED, so the nurses prepared a supply of syringes each day from multiple-dose vials. Vecuronium had been prepared for a trauma patient in the ED, but the syringe was not used. It was not labeled and was inadvertently placed with the saline flush syringes. The syringe containing vecuronium was later used to flush the IV line of an alert three-year-old girl. The child became flaccid, and respiratory efforts ceased. She was quickly intubated and ventilated, and permanent harm was averted.

UNSAFE STORAGE OF PRODUCTS

Subcutaneous (SQ) atracurium, in place of hepatitis B vaccine, was administered to seven infants, who all experienced respiratory distress within 30 minutes. Five infants recovered, one sustained permanent injury, and another died. Neuromuscular blocking agents had never been available as floor stock in the nursery. For convenience, an anesthesiologist from a nearby OR had placed the vial of atracurium in the unit refrigerator near vaccine vials with a similar appearance.

In a pediatric ICU, a respiratory therapist obtained what he thought was a sterile water vial to prepare a nebulizer treatment. As he was piercing the stopper, fortunately he noticed that he had accidentally grabbed a vial of atracurium that someone had inadvertently returned to a respiratory box in the refrigerator. Both the atracurium and sterile water vials had similar purple accents. Unbeknownst to the pharmacy, an anesthesiologist had ordered trial sup...
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plies of mivacurium from a drug representative. When the product was delivered to the pharmacy, it was stocked next to look-alike bags of metronidazole. Both solutions were encased in foil wrappers. Believing metronidazole was the only product in foil wrappers in the pharmacy, a technician labeled several mivacurium bags as metronidazole. The pharmacist missed the mistake, and four patients received mivacurium instead of metronidazole. All of the patients experienced respiratory arrest. One patient died, another was seriously injured, and two recovered.

INADEQUATE KNOWLEDGE OF DRUG ACTIONS

A physician prescribed naloxone (Narcan, Endo) to reverse the effects of morphine in a lethargic patient. An ICU nurse did not recognize the drug on the automated dispensing cabinet screen because it was listed by its generic name. She intended to ask a coworker for the generic name of Narcan, but she became confused and instead asked her coworker for the generic name of Norcuron (Organon, Inc.). The coworker informed her that Norcuron was vecuronium, which the nurse then administered. The patient went into cardiac arrest, was resuscitated, and was placed on a ventilator. She later made a full recovery.

FAILURE TO ENSURE VENTILATOR SUPPORT

A physician in the ED ordered a neuromuscular blocking agent to sedate a combative patient. However, a nurse administered the drug too soon, before the patient could be intubated. The patient experienced cardiac arrest and suffered permanent anoxic injury.

In the next issue of P&T, recommendations to prevent medication errors associated with the use of neuromuscular blocking agents will be discussed.

The reports described in this column were received through the ISMP Medication Errors Reporting Program (MERP). Errors, close calls, or hazardous conditions may be reported on the ISMP Web site (www.ismp.org) or communicated directly to ISMP by calling 1-800-FAILSAFE or via e-mail at ismpinfo@ismp.org.