

STATE OF MICHIGAN
COURT OF APPEALS

Estate of MARIE HEISEY, by its personal
representative, GREGORY HEISEY,

UNPUBLISHED
June 12, 2014

Plaintiff-Appellee,

v

No. 310159
Wayne Circuit Court
LC No. 09-010336-NH

SARA P. KAFI YOVINO, M.D., ROBERT R.
BURKE, M.D., and HENRY FORD
HOSPITAL/HENRY FORD HEALTH SYSTEM,

Defendants-Appellants,

and

DAVID D. KIM, M.D., PRASHANTA
KOIRALA, M.D., LISA D. STAGNER, M.D.,

Defendants.

Before: CAVANAGH, P.J., and OWENS and M. J. KELLY, JJ.

PER CURIAM.

In this claim for medical malpractice, defendants, Sara P. Kafi Yovino, M.D., Robert R. Burke, M.D., and Henry Ford Hospital/Henry Ford Health System appeal by right the jury's verdict in favor of plaintiff, Estate of Marie Heisey. On appeal, Yovino, Burke and Henry Ford Hospital argue that the jury's verdict was tainted by a lack of evidence and other errors. They maintain that, on the basis of these deficiencies, the trial court should have granted judgment in their favor or, at the very least, should have ordered a new trial. We conclude that there were no errors warranting relief. Accordingly, we affirm.

I. BASIC FACTS

Marie Heisey was 57 years old when she died in 2007. Her husband, Gregory Heisey, who is a veterinarian and worked at Henry Ford Hospital as director of bio-resources, testified that Marie worked as an English teacher up until her death. She had scoliosis and developed chronic pain related to her scoliosis in "around the year 2000." She at first tried to control the pain with oral medications and patches, but she disliked them because she felt they "impaired her function." She also "had problems concentrating" and did not "trust herself driving." After

consulting at Henry Ford Hospital's pain clinic, Marie elected to have surgery to implant an intrathecal pain pump. David D. Kim, M.D. implanted the pain pump in August 2006.

Charles Laurito, M.D. testified on the estate's behalf as an expert in anesthesiology and pain medicine. He has a pain clinic, teaches anesthesia residents, and supervises a fellowship in pain medicine. He also uses intrathecal pain pumps in his practice and teaches residents and physicians how to monitor, interrogate, and fill pain pumps. The primary benefit of a pain pump, he stated, is that it is efficient. Morphine, for example, injected at the spine is 100 times more potent than when injected intravenously.

Laurito described for the jury how a pain pump is implanted. After the patient has been intubated and put "to sleep", he turns the patient on his or her side. He then makes an incision between two "spinous processes"—which are the "bones you can feel" going down the middle of your back—and uses "retractors to open up the skin and some of the tissues underneath that." He then uses a special needle to pierce the "thecal sac" and puts a catheter into it and threads it up four or five centimeters. He sews a "purse string stitch around the metal needle hub", removes the needle, and cinches down the stitch and ties it. That way, no spinal fluid leaks. After that, he takes a special device that can be bent to make a curve around the patient's flank and inserts it under the skin. He then makes an incision on the patient's front and dissects down two layers of muscle where he implants the device, which looks like a "hockey puck that wants to be a tear." After that, he attaches the catheter that he "tunneled under the skin" to the pump.

The pain pump is battery powered and has a center reservoir that holds either 20 or 40 milliliters. Marie Heisey's pump held 20 milliliters. The pump can be programmed to deliver medication from the reservoir to the spine at a specific rate. You can also use a device to read the "telemetry" from the pump. The device will identify the patient, how much medication is left, and when the pump has to be refilled.

Records show that Marie Heisey's pain pump was originally filled with 10 milligrams per milliliter of morphine. However, in June 2007, the morphine was switched to Dilaudid. The pump was filled with 1 milligram per milliliter of Dilaudid. Dilaudid—also known as Hydromorphone—is a semi-synthetic opioid similar to morphine, but stronger. Laurito stated that Marie Heisey had six refills and adjustments to the pump before October 2007.

Laurito also described the process for refilling the pump using a Medtronic refill kit. He first has the patient lie down and takes the pump's "telemetry", which verifies the patient's name and tells him how much medication is left. He puts on "a hat, a sterile mask, sterile glove" and cleans "the abdomen very, very well." After he is ready, he uses the drape from the kit and orients the hole over the "area of interest." He then takes the template from the refill kit and "you'll feel the skin and it's called belauding, but all it is . . . it's making sure that the template fits over the pump exactly or as exactly as you can make it fit." If you fit it properly, "that teardrop part matches the teardrop part and this center port matches that silicon port[.]" Next, he takes the 22 gauge needle from the kit and inserts it. The needle, he noted, has a "very characteristic feel" and once its properly placed in the pump it will be "anchored." If it's not anchored, "and you let go, it'll flop over. But once it's in, it's really in and it stands up very, very straight."

After the needle is inserted into the center port, he attaches a device from the kit to the needle and hooks it “up to this syringe [referring to the one from the kit] and then I’ll aspirate.” To aspirate is to pull back on the plunger. He tries to “aspirate exactly” the amount that is supposed to be in the reservoir, but it’s rare that you get the exact amount. After drawing out the medication, he unclamps the tubing and rests his “hand on the skin and then inject[s] a little bit and then aspirate[s] again.” He does this to see if the fluid is perfectly clear or if there is any blood in it. This is just a way to ensure that the needle tip is where he thinks it is. The key is to be certain that he has not missed the pump because if he has missed the pump he would be injecting morphine or Dilaudid directly into the pocket around the pump. That is dangerous because he would be giving “six months worth of opioid right under the skin” and not within the “safety of this device” He’s so worried about that possibility that he does not allow his medical students to perform the procedure. Laurito stated that he disposes of the aspirated medicine, draws up the new medicine into the syringe, reattaches it to the catheter “and then refill[s] the reservoir via the center port.”

Laurito also described a different Medtronic kit that is used to directly access the catheter attached to the pump. This catheter access or side port kit is used “when something is odd or something strange is happening or you want to see the connection between this device and the catheter itself going back into the spine of the patient.” A side port access can be used to push dye into the catheter to see if there is a leak somewhere between the pump and the spinal canal.

The 22 gauge needle from the refill kit will not fit into the side port because it is too big; you must use a 25 or 24 gauge needle from the side port access kit. The side port access kit also contains a 10 milliliter syringe rather than the 20 milliliter syringe found in the refill kit. When you aspirate fluid from the side port, you will get “spinal fluid from the patient.” Laurito testified that it is “very dangerous” to inject medication through the side port because the medication will bypass the pump and go directly to the spine—and it is dangerous to “inject medications directly intrathecally, particularly medications that are concentrated.”

Gregory Heisey testified that his wife was happy with the pump: “she didn’t feel the effects of the narcotic like she did with the oral medications.” She was scheduled to have a refill of the pump on October 30, 2007 at Henry Ford Hospital’s pain clinic. She took the day off for the refill, which was scheduled for late morning.

Rick Kedzierski testified at his deposition, which was read into the record at trial, that he was a physician assistant. He worked at Henry Ford Hospital’s pain clinic under Kim and Yovino. Prior to October 2007, Kedzierski had probably refilled four intrathecal pain pumps under the supervision of an attending or fellow.

On October 30, 2007, Kedzierski saw that Marie Heisey’s name was on the board and, because he was available, he took her chart. This was his first refill as the primary person. He was by himself when he interrogated the pump. The interrogation revealed that there was 13 milliliters of medicine in the pump. Kedzierski stated that he was using the template from the kit to try to find the center port on the pain pump. He tried laying it over the pump on Marie Heisey’s stomach, but could not find it. So he left to get some help.

Yovino testified that she was in her first week of employment at Henry Ford Hospital's pain clinic during the time at issue. She was supposed to "shadow another staff physician" during that week, but "Rick [Kedzierski] came into a room where we were all sitting." "[H]e was gowned up and needed help placing the template" He said he was "having difficulty feeling where the side port of the pump was" because Marie Heisey "had recently gained weight"; he was "having a hard time feeling the landmarks of the pump." Yovino was available so she decided to help.

Yovino went to the room with Marie Heisey and saw that Marie was lying down and "was already sterile and had the white drape over her" Yovino testified that "all the supplies" were already out and the "template was sitting on top of her" Yovino then "put on sterile gloves" and began to feel "for the landmarks of the pump"—specifically, she felt for the "side port" because then you know "exactly how to orient[] the template on top of it." She oriented the template, which she was confident was properly oriented over the pump to access the center port. She then watched as Kedzierski inserted the needle and aspirated 11.5 milliliters of fluid from the pump. She saw that the syringe had bubbles, which shows that you have negative pressure in the reservoir. After discarding the aspirated medicine, she saw Kedzierski refill the reservoir with 20 milliliters of the new medicine.

Yovino testified that she first realized that something was different when Kedzierski removed the needle: "we saw some fluid come out." It came out from "the actual injection site . . . we saw a little bit of fluid come out and go into [Marie Heisey's] navel." In his notes, Kedzierski related that he palpitated the area around the puncture site and more fluid came out. According to Yovino's notes, within one minute, Marie Heisey complained of feeling dizzy. Laurito testified that the records showed that Marie "immediately thereafter" became "apneic"—she was "unable to breathe for herself"—which he concluded was clear evidence that some opioid was affecting Marie Heisey's brain stem and preventing her from breathing. In his notes, Kedzierski stated that Heisey's pupils became pinpoint and she became somnolent at which point they got a crash cart.

Yovino testified that they immediately placed Marie Heisey on oxygen and started an I.V. to administer Narcan. Laurito explained that Narcan is a medication that is used to reverse the effects of opioids. Yovino also retrieved Kim and he obtained a new refill kit and immediately aspirated the pump; he withdrew about 19 milliliters of medicine. She called the emergency room and informed them that they were bringing Marie Heisey down because she had some medicine that had gotten under her skin and she had the "clinical signs of an overdose." Marie Heisey was taken to the emergency room, intubated, placed on a ventilator, and given a Narcan drip.

Lisa Stagner, D.O. testified at her deposition, which was read at trial, that she worked in Henry Ford Hospital's critical care unit from October 31 through November 2, 2007. Stagner stated that she first took over Marie Heisey's care in the critical care unit on October 31. She was led to believe that Marie had received a Dilaudid injection into her muscle. No one told her that the Dilaudid might have been injected into Marie's intrathecal space. Marie Heisey was still on the Narcan drip, but they discontinued it at between 8 and 9 in the morning on November 1.

Gregory Heisey testified that he was with his wife when the doctors discontinued the Narcan on November 1. He and his daughter noticed that Marie Heisey's condition changed after the Narcan was discontinued. Within a couple hours, he saw that her condition was deteriorating; she could not carry on a conversation or stay awake. He tried to get someone's attention, but no one seemed to care. Kim and Yovino, however, showed up and Gregory Heisey told them about the changes. Kim got the critical care unit to restart the Narcan drip, which helped. Gregory Heisey testified that his wife was still on the Narcan drip on November 2 and appeared much improved.

Stagner stated that the goal was to "wean the Narcan and then assess [Marie Heisey] clinically and make sure she's awake and alert and, you know, breathing effectively." She stated that Heisey was still under the influence of Dilaudid on November 2, 2007.

Robert Burke, M.D. testified that he took over for Stagner as the attending physician in the critical care unit on November 3, 2007. Burke reviewed Marie Heisey's charts and was familiar with the course of her treatment. He explained that she had "respiratory failure"—specifically, hypercapnic respiratory failure—which in the hospital is "almost universally due to a narcotic being given." She had been taken off mechanical life support and had been weaned off Narcan. She appeared, in his opinion, to be showing clear improvement and had "resolution" of her illness. She no longer needed ventilation or Narcan and had even been taken off oxygen. She was also "fully alert", "knew where she was", and had "normal vital signs." From this, he concluded that the Dilaudid's toxicity had worn off. Accordingly, he discharged her from the hospital on that same morning.

Gregory Heisey testified that, after her discharge from the hospital, his wife's cough became worse and she became progressively more tired. She was not given supplemental oxygen for use at home, but was merely told to schedule an appointment with the pain clinic in two weeks. His wife got home and "sat or laid down on the sofa and she didn't move much from that." She was out of breath trying to go up the five steps to their bedroom. By Sunday, November 4, 2007, Marie Heisey was having so much trouble sleeping that she decided to call her doctor on Monday. She called to schedule an appointment, but her doctor could not see her until Thursday. Gregory Heisey stated that his wife "didn't want to do anything much" on Monday and Tuesday: "Just any kind of exertion [would] just wear her out even more." Even moving short distances would get her out of breath. She was not panting, "but you could tell she was not breathing normally."

On Wednesday, November 7, 2007, Gregory Heisey got up around 5:30 in the morning to take their exchange student to school. Marie was up and told him to call their minister and ask him not to stop by that day because she was "just too tired." Gregory said he left, but Marie called him at 6:30 and said she "couldn't breathe"; she asked him to "please come home." When he got home, he found Marie "on the sofa flat out totally unresponsive." She was breathing, but her pupils were "pinpoint" and when he tried to pick her up she was "just like a rag doll she flopped." He called 911.

Emergency personnel arrived but could not revive Marie Heisey. She died shortly thereafter.

In May 2009, acting on behalf of his wife's estate, Gregory Heisey sued Yovino, Kim, Prashanta Koirala, M.D., and Henry Ford Hospital for malpractice. The estate alleged that Henry Ford Hospital's staff negligently refilled Marie Heisey's pain pump and caused an overdose of Dilaudid. It further alleged that Henry Ford Hospital's staff negligently discharged Marie Heisey before the effects of her overdose had been resolved and that she ultimately died from that overdose. In an amended complaint filed in May 2010, the estate stated additional claims against Stagner and Burke.

The trial court dismissed the claim against Koirala in April 2011.

In July 2011, the estate asked the court for permission to file a second amended complaint. In the newly amended complaint, it alleged claims against Yovino, Stagner, Burke, and Henry Ford Hospital. In August 2011, the trial court granted in part the motion to amend. The court indicated that Stagner should not be a part of the amended complaint and provided that the complaint would include claims against Yovino for negligently supervising the refill, Burke for negligently discharging Marie Heisey, and for vicarious liability on the part of Henry Ford Hospital. Gregory Heisey stipulated to the dismissal of the claims against Kim and Stagner in August 2011.

The case proceeded to trial. The jury found that Yovino was "professionally negligent in the placement of the template or instruction on the injection site or supervision." It also found that Burke was professionally negligent in the discharge of Marie Heisey from Henry Ford Hospital. Finally, it found that Yovino and Burke's negligence proximately caused Marie Heisey's death.

The trial court entered judgment against Yovino, Burke, and Henry Ford Hospital in December 2011. The total amount of the judgment with costs and sanctions was \$1,014,097.40.

Yovino, Burke, and Henry Ford Hospital moved for judgment notwithstanding the verdict or a new trial in January 2012. The trial court denied the motion in April 2012.

Yovino, Burke, and Henry Ford Hospital now appeal to this Court.

II. JUDGMENT NOTWITHSTANDING THE VERDICT

A. STANDARD OF REVIEW

Yovino, Burke, and Henry Ford Hospital first argue that the estate failed to present any evidence that Yovino or Burke breached the standards of care applicable to them. Even if there were evidence to establish that Yovino or Burke breached the applicable standard of care, they maintain, the estate failed to present any evidence that those breaches caused Marie Heisey's death. For these reasons, the trial court should have granted their motion for judgment notwithstanding the verdict.

As this Court has explained, a motion for judgment notwithstanding the verdict (JNOV) is, in essence, a challenge to the sufficiency of the evidence in support of the jury's verdict. *Taylor v Kent Radiology, PC*, 286 Mich App 490, 499; 780 NW2d 900 (2009). This Court reviews de novo the trial court's decision on such motions by examining all the evidence and all legitimate inferences in the light most favorable to the nonmoving party and determining whether reasonable persons could have differed as to whether the nonmoving party established his or her claim. *Id.* at 499-500. If reasonable persons could reach different conclusions, then the matter was properly for the jury. *Id.* at 500.

B. ELEMENTS OF MALPRACTICE

In this case, the estate did not allege a claim of direct liability against Henry Ford Hospital; it alleged that Yovino and Burke were Henry Ford Hospital's agents and that they were acting within the scope of their authority when they injured Marie Heisey through acts of medical malpractice. Accordingly, Henry Ford Hospital would be vicariously liable for Yovino and Burke's medical malpractice. See *Bailey v Schaaf*, 304 Mich App 324, slip op at 12-14; ___ NW2d ___ (2014). In order to establish that Yovino and Burke committed malpractice, the estate had to prove four elements: the appropriate standard of care governing Yovino and Burke's conduct, that Yovino and Burke each breached the applicable standard of care, that Marie Heisey suffered an injury, and that Yovino and Burke's breach or breaches of the standard of care proximately caused Marie Heisey's injury. *Craig v Oakwood Hosp*, 471 Mich 67, 86; 684 NW2d 296 (2004).

C. BREACH OF THE STANDARD OF CARE: YOVINO

Yovino argues that there was insufficient evidence that she breached the standard of care applicable to her when aiding or supervising the procedure to refill Marie Heisey's pain pump. In making this argument, Yovino passes over the undisputed evidence that Marie Heisey suffered an overdose of Dilaudid during the refill procedure and that she participated in and oversaw the refill procedure. Instead, she challenges the sufficiency of the estate's evidence concerning the specific manner of the breach—namely, through the injection of the Dilaudid refill into the pain pump's catheter access port rather than its reservoir. But, under the facts of this case, the estate did not have to establish that Yovino injected or caused the Dilaudid to be injected into the catheter access port in order to establish that she breached the standard of care.

The evidence established that Kedzierski injected 20 milliliters of 10 milligrams per milliliter Dilaudid directly or indirectly into Marie Heisey and that this injection caused her to suffer nearly immediate respiratory failure. The evidence also established that Kedzierski administered the injection either at Yovino's direction or while under her direct supervision. Indeed, Yovino testified that she placed the template on Marie Heisey and supervised while Kedzierski injected the medicine. Before trial, the parties stipulated that the pain pump was working properly and, in any event, the undisputed evidence at trial showed that the pain pump was working properly on the day of the refill.

Laurito testified that he was not aware of any defect in the pump and that the pump was properly preventing drugs from going through it at any dosage other than what it had been programmed to allow. Yovino's own expert on pain medicine, Joshua Wellington, M.D., also testified that there appeared to be no mechanical problem with the pump. And Kim and Yovino testified that one cannot overfill the pump. Because there was no defect in the pain pump and the pain pump could not be overfilled, the introduction of the Dilaudid into Marie Heisey's system had to have been caused either by a direct injection into her body outside the pump or through an injection into the pump through the catheter access port—there simply was no evidence for any other possible cause of the overdose. Henry Ford Hospital's own records repeatedly referred to Marie Heisey's overdose as iatrogenic, which means "caused by a physician." And there was expert testimony that the injection of Dilaudid either directly into Marie Heisey's body or indirectly through the catheter access port would constitute malpractice.

Laurito testified that Yovino had a duty to ensure that the refill procedure was done appropriately and correctly, which included using the proper template and ensuring that the medicine was not injected into the pump's catheter access port. Even if Yovino did not breach the standard of care by causing or allowing Kedzierski to inject the medicine into the side port, he stated, it still would be malpractice to cause or allow the injection of a lethal dose of Dilaudid into a person outside the pump.

Wellington did testify that Yovino complied with the standard when supervising Kedzierski's refill, even though Marie Heisey suffered a toxic overdose. He explained that Yovino's supervision was "separate from the unintended accidental overdose through which I think no one knows how it truly occurred perhaps nor will ever, but those two events are separate." Wellington did not, however, explain how one could cause or permit the injection of Dilaudid into the patient's body rather than the pump during a refill without it constituting malpractice. And he admitted on cross-examination that it would be a breach of the standard of care to inject or allow the injection of Dilaudid into the catheter access port.

In addition, Yovino admitted that it would constitute a breach of the standard of care to inject the medication intended for a pump refill directly into the patient's body. Instead, the standard of care required her to ensure that Kedzierski injected the Dilaudid into the center port.

Accordingly, there was sufficient evidence to establish that Yovino breached the standard by causing or allowing Kedzierski to inject the Dilaudid directly or indirectly into Marie Heisey's body. In any event, even though the estate did not have to prove that Yovino caused or allowed Kedzierski to inject the Dilaudid into the pain pump's catheter access port in order to establish a breach of the standard of care, the estate nevertheless presented sufficient evidence to permit a reasonable jury to find that Kedzierski did just that.

D. CATHETER ACCESS PORT

Laurito testified that the pain pump had two ports: a center port used to refill the pump's reservoir and a catheter access port that allows direct access to the catheter. He stated that it is dangerous to inject medicine into the catheter access port because the medicine would go directly to the patient's spine. In order to prevent such occurrences, the company that manufactures the pump has two separate access kits.

The refill kit contains a template with a hole in the center, 22 gauge needles, and a 20 milliliter syringe. The catheter access port kit, in contrast, contains a template with the hole set to access the port located at the tear drop tip of the pump, 24 and 25 gauge needles, and a 10 milliliter syringe. In addition, the catheter access port cannot be accessed with the larger 22 gauge needles found in the refill kit; only the smaller 24 and 25 gauge needles will fit into the catheter access port. After summarizing the contents of a refill kit and a catheter port access kit and describing the normal use of those kits, Laurito examined the evidence of the events at issue.

Laurito stated that the most important evidence that “we know to be true” is that after Kedzierski and Yovino injected the Dilaudid into what they stated was the pain pump’s reservoir, Marie Heisey immediately “complained of feeling very funny and then quickly went apneic”—that is, she “quickly stopped breathing and became unresponsive.” He explained that she would have died “at this point” had Kedzierski and Yovino “not given Narcan and given her breaths with a bag and a mask and taken her down to the emergency department for intubation” The fact that Marie Heisey responded to the injection immediately indicates that the injection went directly to her intrathecal space—into her spinal column—which could only have occurred if Kedzierski injected the Dilaudid into the catheter access port. If only a small portion of Dilaudid had been injected into a pocket outside the pump, as claimed by the defense, it would have taken much longer for Marie Heisey to feel the effects because “the gradient pushing the Dilaudid into the vessels is small.” Even if the injection missed the pump and hit an artery, Laurito explained, Marie Heisey would not have suffered such an immediate reaction: “Well, if it [the injection] had missed the center port and if there were an artery, even then I wouldn’t get it within one minute. No, this has to be something that’s intrathecal.”

Laurito also found it noteworthy that Marie Heisey had to be on Narcan for four days after her overdose: “She had to have four days of Narcan infusion, which is really, really unusual.” She had to be on it because “when the physicians tried to wean the Narcan” she again “stopped breathing.” If the Dilaudid had not been injected directly into Marie Heisey’s intrathecal space, the effect would not have been immediate and “it certainly wouldn’t last more than four days.” The “immediate onset of apnea, the immediate loss of consciousness, the need for Narcan for more than four days, that picture tells me that it’s a side port injection.”

Although Yovino testified that she was certain that Kedzierski properly pushed the Dilaudid into the pain pump’s reservoir, Laurito’s testimony was sufficient to create a question of fact as to whether Kedzierski actually pushed the Dilaudid into the catheter access port. Laurito did not offer a theory that was merely consistent with the known facts; he examined the facts and opined that Marie Heisey would not have suffered the immediate and prolonged reaction that she did unless the Dilaudid had been injected directly into her intrathecal space. He further opined that this could only have occurred in one way: Kedzierski must have injected the Dilaudid into the catheter access port. Because Laurito’s opinion was deducible from the known facts, it was not mere conjecture. See *Skinner v Square D Co*, 445 Mich 153, 164; 516 NW2d 475 (1994).

On appeal, Yovino and Henry Ford Hospital argue that Laurito's opinion that Kedzierski must have injected the Dilaudid into the catheter access port was "in complete disregard of all the established facts." But in arguing this position they ignore the evidence that Marie Heisey had an immediate and prolonged reaction to the Dilaudid, which several expert witnesses stated was inconsistent with a subcutaneous or intramural injection.

Yovino herself testified at her deposition that she could not explain why Marie Heisey suffered an immediate, severe, and prolonged reaction to the Dilaudid injection: "It didn't make sense why she went down so hard and long. It didn't—the numbers didn't add up in a patient that's already opioid tolerant." Although she could not explain why Marie Heisey had the reaction that she did, Yovino nevertheless disagreed that her reaction could only be explained by an intrathecal injection. But Kim too testified at his deposition that Marie Heisey's immediate reaction coupled with the evidence that she continued to suffer from the effects of Dilaudid after several days could only be explained by an injection directly into her intrathecal space. Kim did not state how it might have happened, but he agreed that Marie's reaction indicated an intrathecal dose: "But like I said, the length of time it took for her to have respiratory depression, I can only explain that by intrathecal dosage."

Henry Ford Hospital's own pain expert, Wellington, also testified that an intrathecal injection would cause an immediate reaction. Wellington recalled testifying at his deposition that Marie Heisey would not have had a reaction for a half hour had the injection been into the pocket around the pump, which would be consistent with Laurito's theory, but he clarified at trial that an intravenous injection would cause a reaction within a "similar time frame" to that of an intrathecal injection. Similarly, the estate's expert on critical care medicine, Michael Ries, M.D., testified that the prolonged need for Narcan showed that the injection was intrathecal. Nevertheless, instead of discussing this evidence or offering an alternate explanation for the fact that Marie Heisey had an immediate reaction, Yovino and Henry Ford Hospital contend that Laurito's inability to explain away every piece of evidence that tended to suggest that Kedzierski did not access the catheter access port demonstrates that he had no factual basis for his theory.

Contrary to the evidence that Marie Heisey suffered a reaction that was consistent with an intrathecal injection, Yovino testified that she and Kedzierski used a refill kit and properly accessed the pump's reservoir during the refill procedure. According to Yovino, she did everything properly. She testified that it was a complete mystery as to how Marie Heisey suffered an overdose: "I still to [] this day have no idea of how it [the Dilaudid] got out. Everything was, you know, exactly how a normal pump refill would be. Everything looked normal until the needle came out, so I still don't know how it got out."

Yovino and Henry Ford Hospital also make much of the evidence that the kits are so clearly marked that presumably no one could make the mistake of using the wrong kit. Yovino was sure that they used the proper kit. She was also sure Kedzierski did not inject the Dilaudid into the catheter access port. Instead, he aspirated 11.5 milliliters of medicine from the pump's reservoir and then injected 20 milliliters of Dilaudid into that same reservoir. She also stated that the pump's telemetry indicated that there should be approximately 13 milliliters of medicine remaining in the pump. However, no one ever printed the telemetry from the machine, so there were no records of the actual readout. Yovino and Henry Ford Hospital argue that, because there was evidence that Kim rushed into Marie Heisey's room after she went apneic and aspirated

about 19 milliliters of medicine from the reservoir, Kedzierski must have accessed the reservoir because there was no other way to explain how there would be more than 13 milliliters of fluid in the reservoir.

The evidence that showed that Kedzierski and Yovino used the correct kit and properly accessed the center port, if believed, was inconsistent with Laurito's theory that Kedzierski must have injected the Dilaudid directly into Marie Heisey's intrathecal space. Accordingly, Laurito tried to explain how this evidence might be consistent with the evidence that Kedzierski actually injected the Dilaudid into Marie Heisey's intrathecal space.

Laurito noted that Kedzierski did not record that he used a refill kit on the day at issue and did not list the size of the needle that he used, which was contrary to the practice from previous refills. Kedzierski did, however, state in his report that he used a ten milliliter syringe to aspirate the pump's reservoir. Laurito testified that the evidence that Kedzierski may have used a ten milliliter syringe, which is only found in the catheter access kit, was consistent with the evidence that Kedzierski had to have injected the Dilaudid into the catheter access port.

Kedzierski later claimed that his notes concerning the events of that day were erroneous; he said he actually used a 20 milliliter syringe and the reference to a ten milliliter syringe was a typographical error. Similarly, Yovino testified she saw Kedzierski use a 20 milliliter syringe. Nevertheless, a reasonable jury could find that Kedzierski's note—which was made on the same day as the actual events—accurately reflected the syringe that he used. It could further infer that the ten milliliter syringe came from a catheter access kit rather than a refill kit, which would then permit an inference that Kedzierski and Yovino used the wrong template and accessed the wrong port on the pain pump when he pushed the Dilaudid.

Laurito also testified that Kedzierski's notation that he had some difficulty pushing the Dilaudid into the pump was consistent with his theory. Laurito testified that it should not be difficult to push medicine into the reservoir. But it would be difficult, he related, to push 20 milliliters of medicine into the catheter access port because one would be using the smaller needle necessary to inject medicine into the catheter access port, which would make it more difficult.

Yovino contradicted Kedzierski's note and stated that she did not see Kedzierski have any problems pushing the medicine. Henry Ford Hospital's expert on pain medicine, Joshua Wellington, M.D., opined that it would be easier to push medicine into the catheter access port. Thus, one might infer that any difficulty that Kedzierski had in pushing the medicine was consistent with injecting the medicine into the reservoir. Except that Yovino testified that she saw bubbles in the syringe when Kedzierski aspirated the reservoir. The bubbles, she explained, showed that the reservoir had a negative pressure, which would not have occurred if Kedzierski had aspirated the catheter. But if the reservoir had a negative pressure—as opposed to the catheter's consistent pressure—one could infer that it would be much easier to push medicine into the reservoir. And, consistent with this understanding, Yovino testified that the negative pressure would actually pull the medicine into the reservoir without the need to push the plunger. As such, a reasonable jury could conclude that Yovino was mistaken about the ease with which Kedzierski injected the medicine and—on that basis—mistaken about whether he accessed the pain pump's catheter access port rather than its reservoir.

The one piece of inconsistent evidence that Laurito could not explain was the evidence that Kim aspirated approximately 19 milliliters of medicine (or other fluid) from the reservoir shortly after Marie Heisey began to show signs of an overdose. Because there was evidence that the reservoir only had 13 milliliters of medicine in it prior to the start of the refill procedure, Kim could not have aspirated so much medicine had Kedzierski not injected something into the reservoir. To address this evidence, Laurito offered an explanation that Kedzierski must have tried to access the reservoir on his own before seeking aid and inadvertently injected some fluid into the reservoir. Laurito's explanation for the increased volume in the reservoir was speculation and, therefore, likely irrelevant and inadmissible. MRE 401; MRE 402. But Laurito's speculative attempt to explain the evidence that was inconsistent with his theory did not alter the fact that his theory was itself reasonably founded on established facts. See *Skinner*, 445 Mich at 164. A plaintiff does not have to refute every piece of evidence that is inconsistent with the plaintiff's theory. *Craig*, 471 Mich at 87-88. Rather, the plaintiff need only present evidence sufficient to permit a reasonable jury to find that plaintiff's version of events is more likely than not what actually happened. See *Mulholland v DEC Int'l*, 432 Mich 395, 413-414; 443 NW2d 340 (1989).

Here, there was compelling evidence that Kedzierski must have injected the Dilaudid into Marie Heisey's intrathecal space, which he could only have done by accessing the catheter access port. In contrast to that evidence, there was evidence that—if believed—showed that Kedzierski must have accessed the reservoir, but somehow injected some of the medicine into the space around the pump.

Even though there was conflicting evidence, the jury was not left to guess which version of events actually happened; the theories were not equally persuasive and, depending on how the jury assessed the weight and credibility of the witnesses and evidence, the jury would have to either reject or accept Laurito's opinion as to where Kedzierski injected the Dilaudid. *Skinner*, 445 Mich at 174. Because there was substantial evidence from which the jury could infer that Kedzierski injected the Dilaudid directly into Marie Heisey's intrathecal space, it was for the jury to decide the issue. *Id.* at 165-166; see also *Mulholland*, 432 Mich at 414 (“We require only expertise of experts, not omniscience. In our view, it is sufficient if the expert has an evidentiary basis for his own conclusions.”).

The trial court did not err when it denied Yovino and Henry Ford Hospital's motion to the extent that they claimed the estate failed to present evidence from which a reasonable jury could conclude Yovino breached the standard of care.

E. BREACH OF THE STANDARD OF CARE: BURKE

Burke and Henry Ford Hospital also argue that the estate failed to present any evidence that Burke breached the standard of care by discharging Marie Heisey on the morning of November 3, 2007. Specifically, they argue that the undisputed evidence showed that Marie Heisey's overdose had resolved and that her respiration was stable. As such, there was no clinical basis for ordering more tests or holding her for further observation. Additionally, they argue that the estate failed to present any expert testimony that, had Burke not discharged Marie Heisey, she would not have died. For these reasons, Burke and Henry Ford Hospital maintain that the trial court should have entered judgment in their favor as to the claim against Burke.

Burke took over as the attending physician for the critical care unit where Marie Heisey was being treated on the morning of Marie's discharge. Although he did not recall Marie, Burke testified that he was certain that he physically met her on that morning because he noted as much on the chart. He stated he would have reviewed Marie Heisey's case with the attending physician that he was relieving, Stagner, and would have reviewed Marie Heisey's flow chart.

Burke stated that Marie Heisey had had "hypercapnic respiratory failure", which is caused by narcotics that cause the patient to breathe too slowly. However, by the time he took over her care, the charts demonstrated that her overdose had resolved:

And over a period of 24 hours she was taken off mechanical life support, the ventilator. Over the next 48 hours she was weaned continuously and the periods off the Narcan. Over a period of 48 hours that was stopped. So she had a clear improvement in her level of illness that was responding well to treatment, and by the morning that I had seen her she had resolution.

Burke further testified that Marie Heisey was "fully alert" and "knew where she was" on the morning of her discharge. She also had normal vital signs. He's also certain that he talked to her because it "would have been unusual to not talk with her and it would have been rude." To him, the fact that Marie Heisey was "fully alert, talking, . . . interacting with her environment in a normal mental state", was the most important aspect of the evaluation—even more so than the notation that Marie Heisey had not suffered any apnea since she was taken off Narcan at 2 p.m. the prior day. If she had been drowsy or hard to arouse, he would have kept her for observation to ensure that the overdose had resolved. But, because she was alert and there were otherwise no signs of respiratory distress, he did not feel that it was necessary to perform any more tests or hold her for further observation. He also felt that it was appropriate to prescribe Oxycodone because Marie Heisey needed some pain medication to help her manage her chronic pain after discharge and the dose was a safe dose.

In contrast to Burke's optimistic view of the record, the estate presented evidence that Marie Heisey's overdose was unusual and that she continued to show signs of persistent respiratory difficulty right up to the morning of her discharge.

Laurito testified that Kedzierski and Yovino gave Marie Heisey a massive overdose of Dilaudid, which essentially killed her: "She stopped breathing. She stopped responding. She died. And then because there were medications and I.V.s and they had the ability to intubate her, she was then resuscitated. So it was a reversible death, but she did indeed die from this injection." Once she stopped breathing, Marie Heisey had a limited time before her death would be permanent:

So her oxygen levels are being depleted because her heart is still pumping and her entire CO2 is climbing because all her cells are still metabolizing and putting the products of metabolism back into the blood stream. And without breathing, second by second the person becomes more and more acidotic and at some point enters irreversible death where nothing we can do can bring her back from that state.

After Kedzierski and Yovino injected the Dilaudid into Marie Heisey, the hospital performed a blood gas test on her. A blood gas test analyzes the amount of CO₂ in the patient's blood. Marie had an arterial CO₂ level of 80.0, which Laurito characterized as "wildly off" and "tremendously higher than it should be." He explained that it should have been about "45 or 50 at most." This demonstrated that Marie was not breathing and, therefore, not "blowing off carbon dioxide." Even on November 1st, Marie Heisey had a blood gas of 53.6, which is high, but not life-threatening.

Laurito testified that Dilaudid does not act on the lungs, but rather acts on the brain to suppress breathing. Laurito testified that Marie Heisey's charts show that she was intubated for at least two days. She was also on supplemental oxygen until an hour before she was discharged.

The estate's expert cardiologist, Gregory M. Lewis, M.D., testified that even at that point Marie's oxygen level was "not normal." But even if her oxygen saturation had been normal, that alone would not tell you if Marie Heisey had suppressed breathing: "As long as you have enough oxygen in your lungs your saturation will be good." Indeed, he explained, "I could put you on 100 percent oxygen and keep your oxygen levels high, even though you quit breathing, you know, for several minutes." In contrast, "you have to breathe carbon dioxide in and out. You have to flush it out with every breathe. Carbon dioxide can continue to rise and be abnormally high even though your oxygen saturation stays normal." This can be seen, he related, by the fact that Marie Heisey had an oxygen level of 143 at 4:40 p.m. on the day of her overdose, and yet had extremely high carbon dioxide levels at the same time. Therefore, in order to be certain about whether the Dilaudid was still affecting Marie Heisey, the hospital's staff would have had to check her blood gas levels, which they did not do on the day of her discharge.

As a whole, Laurito stated, the evidence showed that the Dilaudid was still affecting Marie Heisey's ability to breathe. Laurito noted that there was evidence that Marie Heisey was "air hungry" at home: "she's tired. She can't do very much." This is consistent with continued effects from Dilaudid because it acts on the brain to suppress ventilation and "you don't breathe nearly as vigorously." "So now she had to breathe faster and work harder to get an adequate amount of oxygen in and an appropriate amount of carbon dioxide off." This would make her feel "exhausted" because, as a result of the "depression in the brain stem, the work of breathing has gone up." He felt that the continued effects of the Dilaudid caused Marie Heisey to "breathe less efficiently" and "as days passed" her arterial carbon dioxide levels "climbed and she became more acidotic" until she just died. Lewis agreed that the Dilaudid was still affecting Marie on the day of her death and likely caused her death.

Michael Ries, M.D., testified on the estate's behalf on the standard of care applicable to Burke. He stated that he practiced internal medicine, pulmonary medicine, and critical care medicine. Ries testified that the primary dangers associated with Dilaudid involve the suppression of respiration and decreased mental status and, with large doses, decreased blood pressure. The records show that Marie Heisey had a drop in blood pressure on the day of the overdose and then again in the intensive care unit on November 2 and on the morning of her discharge. She was also on Narcan for a prolonged period of time. This evidence should have caused Burke to realize that this was not a normal overdose. If this had been a normal overdose, the Dilaudid should have cleared from Marie Heisey's system within 12 hours.

After taking over the critical care unit on the morning of November 3, Ries stated, Burke should have discussed Marie Heisey's case with Stagner and should have examined Marie himself and there is no evidence in the record that he did so. Instead, Gregory Heisey testified that Burke never examined his wife on the day of her discharge. Ries opined that the evidence that Marie Heisey suffered an intrathecal overdose coupled with the evidence that she still had elevated carbon dioxide levels made it necessary for Burke to ensure that Marie's respiratory problem had resolved by checking to see if she had a normal blood gas test, which he did not do. Ries said that Marie's blood pressure was still low just an hour and a half before her discharge and she was only off oxygen for a few hours before her discharge. Given the evidence that this was an "unusual case with prolonged effect of the Dilaudid", this short period of observation was insufficient to "warrant certainty that the drug effect had worn off."

For these reasons, Ries opined that Burke violated the standard of care when he discharged Marie Heisey because he should have kept her for a "prolonged period of observation after stopping that antidote [Narcan]" and should have performed further tests to ensure that she was ventilating properly. He also believed that, had she been observed longer, she would probably be alive. He explained that the evidence concerning Marie Heisey's condition after her discharge and from her death, showed that she was still suffering from the effect of the Dilaudid and that it likely caused her death. And, although he did not specifically testify that the hospital staff would have discovered that Marie was still under the influence had they observed her longer, a reasonable jury could infer that that was his conclusion from his testimony.

A reasonable jury—examining Burke's testimony along with the documentary evidence—could have found that Marie Heisey showed significant signs of improvement that warranted discharging her from the hospital. But, contrary to Burke and Henry Ford Hospital's contention on appeal, there was also significant evidence from which a reasonable jury could have found that Marie Heisey had an unusually severe and persistent overdose and was still under the influence of Dilaudid on the day of her discharge and through to the day of her death. Ries testified that the peculiar circumstances surrounding Marie Heisey's overdose were such that Burke had an obligation to take extra steps to ensure that Marie Heisey was no longer under the influence of Dilaudid before discharging her. Specifically, he should have held her for a longer period of observation and should have checked her blood gas. On the basis of Gregory Heisey's testimony and the absence of any direct evidence in the medical records, a jury could also have found that Burke did not actually examine Marie Heisey and, therefore, was incorrect when he stated that Marie was fully alert. Accordingly, there was evidence from which a reasonable jury could find that Burke breached the applicable standard of care by discharging Marie Heisey without adequate observation or testing.

Whether Burke breached the applicable standard of care when he discharged Marie Heisey without first conducting tests or holding her for a longer period of observation was a matter for the jury. *Taylor*, 286 Mich App at 500.

F. CAUSATION

At trial, Yovino, Burke, and Henry Ford Hospital presented evidence that Marie Heisey did not die from her overdose of Dilaudid. Kris Lee Sperry, M.D. testified that he was the chief medical examiner for the State of Georgia. He testified that tissue slides from Marie Heisey's heart showed some abnormalities. He determined that she must have died from a "sudden cardiac arrhythmia" caused by the abnormal tissue. He stated that her death could not have been caused by Dilaudid because there was no evidence that it was in her blood after her death, which "means that it's gone." Notwithstanding Sperry's testimony, the estate presented testimony and evidence from which a reasonable jury could find that the overdose administered by Kedzierski and Yovino caused Marie Heisey's death.

As explained more fully below, Laurito opined that the record evidence showed that Marie Heisey died from the continued effects of Dilaudid. He rejected the notion that the negative blood test showed that Dilaudid was not in her system because it was most likely to be found in the brain or epidural tissue. He also testified that there was no evidence that Marie Heisey had a heart attack and he was surprised by how well her heart handled the stress of the initial overdose.

Lewis testified that Marie Heisey showed no signs of having died of a cardiac cause. Indeed, Lewis characterized Sperry's opinion as "absolutely incorrect." He explained that Marie Heisey had no evidence of cardiac disease and tolerated the "extreme stress" of the acute phase of the Dilaudid overdose. He similarly stated that the evidence from the emergency medical responders showed that Marie's heart was pumping properly on the day she died. He stated that one simply cannot go from ventricular fibrillation to pulseless electrical activity, as was found with Marie on the day she died. From the totality of the circumstances, Lewis concluded that the Dilaudid caused Marie's death.

The estate's pathologist, Bader Cassin, M.D., similarly rejected the contention that there was anything wrong with Marie Heisey's heart. Cassin stated that there was some evidence that Marie Heisey had abnormal heart cells, but he said that the abnormalities were "of no consequence at all", that one sees the abnormalities in a "lot of hearts", and that the abnormalities were consistent "with her age." Because an examination of Marie's body provided no explanation for her death, Cassin looked to the background events leading to her death. The background revealed that Marie Heisey was a "respiratory cripple" during the period after her discharge from the hospital. In addition, although she had chronic back pain, she did not need pain medication after her discharge; this suggested to him that she was still under the influence of Dilaudid. Finally, given the totality of the evidence and the fact that she complained that she could not breathe shortly before her death suggested to him that the Dilaudid caused her death. Cassin also rejected Sperry's contention that the negative blood test showed that Marie Heisey had no Dilaudid in her system on the day she died because Dilaudid can be in the central nervous system without being in the circulating blood.

Because there was evidence that Marie Heisey died from the persistent effects of her Dilaudid overdose, a reasonable jury could infer that Yovino's breach of the standard of care applicable to her caused Marie Heisey's death. And there was also evidence from which a reasonable jury could find that had Burke kept Marie Heisey for further observation or

performed a blood gas test, those additional measures would have revealed that she was still under the influence of Dilaudid. Because the jury heard extensive testimony concerning how Marie Heisey had been successfully treated for her initial and significantly more dangerous initial overdose of Dilaudid, it could reasonably infer that the hospital would have continued to treat Marie with Narcan and other measures until the Dilaudid passed from her system had Burke acted within the standard of care and discovered that Marie was under the continued influence of Dilaudid. From this, the jury could infer that Burke's breach of the standard of care caused Marie Heisey's death.

The estate presented sufficient testimony and evidence from which a reasonable jury could find that Yovino and Burke breached the standard of cares applicable to them and caused Marie Heisey's death. Consequently, the trial court did not err when it denied Yovino, Burke, and Henry Ford Hospital's motion for JNOV. *Id.*

The trial court did not err when it denied Yovino, Burke, and Henry Ford Hospital's motion for judgment notwithstanding the verdict.

III. EXPERT QUALIFICATION

A. STANDARD OF REVIEW

Yovino, Burke, and Henry Ford Hospital next argue that the trial court should have precluded Laurito from testifying as an expert because his opinion was not founded on facts in evidence and was not the product of reliable principles and methods, which were applied reliably to the facts of the case.¹ This Court reviews a trial court's decision concerning the competency of an expert witness to testify on a specific matter for an abuse of discretion. *Gay v Select Specialty Hosp*, 295 Mich App 284, 290; 813 NW2d 354 (2012). This Court, however, reviews de novo whether the trial court properly selected, interpreted, and applied the law in making its determination on an expert's qualifications. *Id.* at 291.

B. ANALYSIS

A trial court may permit a person to testify as an "expert by knowledge, skill, experience, training, or education" when the "court determines that scientific, technical, or other specialized knowledge will assist the trier or fact to understand the evidence or to determine a fact in issue." MRE 702. However, before permitting an expert to testify in the form of an opinion, the trial court must ensure that the expert's proposed testimony "is based on sufficient facts or data," "is the product of reliable principles and methods," and that the expert "has applied the principles and methods reliably to the facts of the case." MRE 702. Similarly, under MCL 600.2955, an expert's opinion "is not admissible unless the court determines that the opinion is reliable and will assist the trier of fact." Accordingly, "trial courts must—at every stage of the litigation—

¹ Although Yovino, Burke, and Henry Ford Hospital refer to the estate's expert witnesses, on appeal they have only addressed Laurito's testimony. Therefore, we have limited our discussion accordingly.

serve as the gatekeepers who ensure that the expert and his or her proposed testimony meet the threshold requirements.” *Gay*, 295 Mich App at 291, citing *Gilbert v DaimlerChrysler Corp*, 470 Mich 749, 782; 685 NW2d 391 (2004). While the exercise of this gatekeeper function has been committed to the trial court’s discretion, “a trial judge may neither ‘abandon’ this obligation nor ‘perform the function inadequately.’” *Gilbert*, 470 Mich at 780, quoting *Kumho Tire Co Ltd v Carmichael*, 526 US 137, 158-159; 119 S Ct 1167; 143 L Ed 2d 238 (1999) (Scalia, J., concurring).

On appeal, Yovino, Burke, and Henry Ford Hospital characterize the expert testimony on causation as purely speculative and unsupported by the state of current medical knowledge:

Plaintiff’s causation theory against both Dr. Yovino and Dr. Burke at trial was that, because it “binds to fat” with relative ease, the Dilaudid remained isolated or “sealed off” in Mrs. Heisey’s brain and spine for 9 days, the last 5 without any symptoms of Dilaudid acting on the brain to decrease respirations—respiratory insufficiency or increased CO₂. Then, plaintiff’s experts claimed, on November 7, for some unknown reason, the Dilaudid suddenly acted to impair Mrs. Heisey’s respiratory function so severely as to cause death, without leaving a trace of the drug on autopsy.

This summary, however, mischaracterizes the expert testimony, mischaracterizes the factual record, and ignores that the estate’s lawyer demonstrated before trial that the proposed expert testimony was supported by analogous peer-reviewed medical literature.

There was never any dispute either before or at trial concerning Laurito’s qualifications as an expert on anesthesiology and pain medicine. Laurito testified at trial that he was familiar with the opioid family of drugs and had “used almost all of the opioids at one time or another” in his practice. He also testified that he was specifically familiar with two opioids: morphine and Dilaudid. Dilaudid is stronger than morphine and is “more lipid soluble.” Because it is more lipid soluble, Dilaudid will bind with fatty tissue in addition to water. While Morphine prefers to be in the water phase and Dilaudid prefers to be in oil phase, solubility is “all a continuum.” Thus, Dilaudid can be found in both phases.

Laurito examined the evidence concerning Marie Heisey’s condition after her discharge from the hospital and concluded that it was consistent with the continued effects of Dilaudid. He noted that there was evidence that Marie Heisey was “air hungry” at home: “she’s tired. She can’t do very much.” Although she was typically very active, she could not participate in her normal activities after going home. And that is consistent with Dilaudid because the drug acts on the brain to suppress ventilation and “you don’t breathe nearly as vigorously.” “So now she had to breathe faster and work harder to get an adequate amount of oxygen in and an appropriate amount of carbon dioxide off.” This would make her feel “exhausted” because, as a result of the “depression in the brain stem, the work of breathing has gone up.”

Given the evidence about Marie Heisey’s condition after her discharge, Laurito concluded that the Dilaudid had not fully cleared from her system and he explained how that might be: “So she still has Dilaudid, to my way of thinking, sequestered in her brain stem in the epidural fat in the spinal fluid that is still there.” The Dilaudid was still present after all this time

because Marie Heisey was given “just a mammoth dose” of Dilaudid. Laurito stated that the normal half life of Dilaudid in the blood is “2.3 hours.” And he agreed that the half life of Dilaudid in blood might be relevant if Marie Heisey had a small injection intravenously or intramuscularly, but the evidence—in his view—showed that she received a dose 2,000 times her daily dose injected directly into her intrathecal space. This evidence, he felt, rendered the half life in blood not “helpful” or “relevant” to the case because the overdose involved “is so complicated.” Specifically, the drug circulated through “different kinds of tissue” in a multicompartiment model. In addition, Dilaudid is lipid-soluble and binds to proteins, which alters the rate at which the drug clears:

So it becomes irrelevant what the half life of Dilaudid is. If 2,000 times a dose is given in a fat lipid—in a very lipid environment of the intrathecal space that is contiguous with the brain and the brain stem, and is one membrane away from all of the fat in the epidural space, the half life that’s drawn in the blood doesn’t really mean anything. We have so much sequestered in the brain itself, that it’s just—it’s not of any real importance.

Laurito also did not testify that the Dilaudid ceased operating to depress Marie Heisey’s breathing at some point and then “suddenly” acted to suppress her breathing on the day she died, as claimed by Yovino, Burke, and Henry Ford Hospital on appeal. Rather, Laurito testified that the Dilaudid affected her ability to breathe continuously “until her death.” He stated that the magnitude of the overdose coupled with the solubility of the Dilaudid and the fact that it was injected into the intrathecal space was such that it would “stay with her for a very long time.” He felt that the continued effects of the Dilaudid caused Marie Heisey to “breathe less efficiently” and “as days passed” her arterial carbon dioxide levels “climbed and she became more acidotic” until she just died.

Laurito also thought the fact that she took an Oxycodone on the day of her death may have been enough to push her over. There was a point when she just became so “acidotic” that she went into “electromechanical dissociation or pulseless electroactivity.” Pulseless electrical activity, which is what the emergency personnel found when they arrived on the day of Marie Heisey’s death, is when the heart is working electronically, but “the blood is so acidic that even though there is good electroproduction, the heart isn’t able to generate a pulse.”

He also rejected the contention that the evidence that Dilaudid was not detected in Marie Heisey’s blood after her death indicated that Dilaudid played no role in her death. He stated that the blood test might have been appropriate for someone who ingested or injected the Dilaudid, but that a brain biopsy or epidural biopsy would have been necessary to determine whether there was Dilaudid still in her system.

As can be seen from his actual opinions, Laurito founded his opinions on the medical records that suggested Marie Heisey was still under the influence of the Dilaudid within hours of her discharge, the testimony from Marie’s family concerning her condition while at home, and the emergency personnel’s reports. Using this evidence, he opined that Marie Heisey was still under the influence of Dilaudid after her discharge and continued to be under its influence through to the day she died. Further, he explained why the blood test performed after Marie Heisey died would not be dispositive as to whether she was still under the influence of Dilaudid

on the day she died. Consequently, Yovino, Burke, and Henry Ford Hospital's contention that Laurito's opinion was unreliable because it was not founded on "evidence to support the claim that Dilaudid was present" is without merit.

Yovino, Burke, and Henry Ford Hospital also argue that Laurito's opinions did not meet the admissibility requirements of MRE 702 because there were no scientific studies or literature to support his belief that Dilaudid could be sequestered or remain isolated in the brain or spine "without symptoms and undetectable" for days only "suddenly to be released into the blood stream to suppress respiratory function and cause death." As already noted, this is a mischaracterization of Laurito's opinion. He did not opine that the Dilaudid would be sequestered or isolated for days without any symptoms and then suddenly release causing death. He testified that, because of the complex systems involved with an intrathecal injection and the magnitude of the dose, he would expect the Dilaudid to take significantly longer to dissipate from Marie Heisey's system. He also did not state that the Dilaudid would not cause symptoms; indeed, he expressed the opposite: he opined that the evidence of Marie's actual condition during the events at issue showed that she was under the continued influence of Dilaudid even after her release from the hospital. He also did not state that the Dilaudid would be undetectable; rather, he stated that it might not be detectable in the blood and that it would have been better to perform a biopsy of the brain or an epidural biopsy to detect the Dilaudid. Moreover, Yovino, Burke, and Henry Ford Hospital did not—and have not—disputed that Dilaudid is an opioid, is lipid soluble, and do not dispute how it operates to suppress respiration. Understood in light of Laurito's actual opinions, Yovino, Burke, and Henry Ford Hospital's challenge must be understood as a challenge to the reliability of Laurito's opinion that Dilaudid would persist for a longer period of time if injected into the intrathecal space than it would if injected intramurally or intravenously.

In *Edry v Adelman*, 486 Mich 634, 642; 786 NW2d 567 (2010), our Supreme Court explained that a party may not "simply point to an expert's experience and background" to show that the expert's opinion is reliable. *Id.* at 640. Instead, the party must be able to demonstrate that there is scientific support for the expert's opinion, which may be shown by submitting supporting literature. *Id.* In that case, the Court held that the trial court properly excluded an expert where the expert merely asserted an opinion about the survivability rate of a person with a specific type and stage of cancer without any evidence that the opinion was independently supported. *Id.* at 640-642. *Edry* did not, however, involve an expert who had made actual observations that supported his theory.

At his deposition, Laurito explained that his understanding concerning the length of time that an opioid would persist after an intrathecal injection derived in part from his personal observations in his pain practice—that is, his opinion was informed in part from actual observations that intrathecal injections of lipid soluble opioids will last quite awhile longer. In addition, the estate provided the trial court with three peer-reviewed articles that broadly discussed the use of opioids in intrathecal space.

In one article,² the authors injected morphine into test subjects. Some subjects had the morphine injected intravenously, some had the morphine injected into the intrathecal space, and others received a placebo injection. The authors observed that the test subjects who received an intrathecal injection had significantly depressed ventilator response compared to the subjects that had an intravenous injection after twelve hours. They also observed that the subjects with the intrathecal injection had plasma concentrations of morphine and morphine metabolites that were undetectable or much lower than those observed for the subjects with an intravenous injection. From their observations, the authors concluded: “Depression of the ventilator response to hypoxia after the administration of intrathecal morphine is similar in magnitude to, but longer-lasting than, that after the administration of an equianalgesic dose of intravenous morphine.”

The authors’ observations and conclusions are consistent with Laurito’s observations in his practice and with his opinion on the persistence of opioids when injected into the intrathecal space. Moreover, because Dilaudid is an opioid related to morphine and is both water and lipid soluble, it is reasonable to assume that Dilaudid would behave in a similar fashion notwithstanding the authors remarks that lipophilic opioids are “less likely than hydrophilic opioids” to be retained in the central nervous system. Therefore, this article supports the conclusion that Laurito’s opinion concerning the lasting effects of opioids such as Dilaudid when injected into the intrathecal space had support in the scientific community.

In a second article,³ the authors discussed the effects of injecting opioids into the intrathecal space. The authors of this article observed that lipophilic opioids injected into the intrathecal space tended to take effect faster than morphine, which is hydrophilic, but did not persist for as long a period. Although this article might on the surface appear to contradict Laurito’s opinion that Dilaudid might bond with lipids and persist for a longer period, it must be recalled that Dilaudid is both lipid and water soluble. As such, it will have some of the characteristics of both. In addition, the authors of the article pointed out that, after intrathecal injection, the “disposition of opioids is complex” and lipophilic opioids will become “sequestered in the epidural fat”, which is consistent with Laurito’s opinion. In addition, the authors noted, when injected into the intrathecal space, Dilaudid produces analgesic effects and lasts as long as twice the amount of morphine. Thus, this article supports Laurito’s contention that Dilaudid can persist in a patient’s system for an extended period of time.

In a third article,⁴ the authors tested the concentrations of morphine and other opioids found in the epidural space and cerebrospinal fluid after injecting the drugs into the epidural space of pigs. After discussing their observations, the authors noted that “hydrophobic opioids are sequestered in lipoidal environments surrounding the epidural space to a greater degree than

² Bailey et al, *Effects of Intrathecal Morphine on the Ventilatory Response to Hypoxia*, The New England Journal of Medicine (October 26, 2000).

³ Rathmell et al, *The Role of Intrathecal Drugs in the Treatment of Acute Pain*, Anesthesia & Analgesia (2005; 101:S30-S42).

⁴ Bernards et al, *Epidural, Cerebrospinal Fluid, and Plasma Pharmacokinetics of Epidural Opioids (Part 1)*, Anesthesiology (Aug 2003, v 99, no 2).

are more hydrophilic drugs.” These sequestered drugs then slowly released back “into the extracellular fluid of the epidural space” which results in “a prolonged elimination half-life” for the drugs. Because Dilaudid is an opioid that has hydrophobic characteristics, these authors’ observations and conclusions may be extrapolated to apply to Dilaudid. Thus, this article too supports Laurito’s opinion that a massive dose of Dilaudid into intrathecal space would take significantly longer to dissipate because a portion would be sequestered in the lipid environments and then slowly release over time.

Yovino, Burke, and Henry Ford Hospital’s expert witnesses tried to distinguish the observations from these articles or expressed skepticism as to whether the articles could be applied to the facts of this case. Nevertheless, a fair reading of the articles shows that each article included observations and conclusions that supported Laurito’s opinion.

No party contested Laurito’s expert qualifications. In addition, although the parties’ experts disagreed about whether the evidence showed that Marie Heisey was still under the influence of Dilaudid after her discharge and whether the Dilaudid caused her death, there was evidence from which a reasonable jury could infer that Marie Heisey’s respiration was suppressed even after her discharge from the hospital. Further, the estate sufficiently established—both before trial and at trial—that Laurito’s opinion that Dilaudid can persist for a protracted period of time when injected into a person’s intrathecal space was supported by his clinical observations and analogous peer-reviewed articles.

As this Court has explained, the fact that two scientists “value the available research differently and ascribe different significance to that research does not make either of their conclusions unreliable.” *Chapin v A & L Parts, Inc*, 274 Mich App 122, 139; 732 NW2d 578 (2007) (opinion by DAVIS, J.). This is because “science is, at its heart, itself an ongoing search for truth, with new discoveries occurring daily, and with regular disagreements between even the most respected members of any given field.” *Id.* In contrast, when a trial court is asked to determine whether an expert’s opinions are sufficiently reliable to permit admission at trial, the court is not called upon to resolve a scientific dispute over the implications of research, but is instead charged with ensuring that the jury will not be called “on to rely in whole or in part on an expert opinion that is only masquerading as science.” *Id.* Accordingly, the trial court need not determine whether “an expert’s opinion is necessarily correct or universally accepted. The inquiry is into whether the opinion is rationally derived from a sound foundation.” *Id.*

It also bears noting that other expert witnesses testified consistently with Laurito’s opinion that Dilaudid would persist in a patient’s system for a much longer period when injected into intrathecal space or remain in the patient’s central nervous system. At her deposition, Stagner testified that no one told her that Marie Heisey might have received her overdose through an intrathecal injection. And when asked to explain why Marie Heisey had to be on Narcan for such a protracted period of time, Stagner stated: “I know the intrathecal Narcan—I mean, intrathecal Dilaudid has a much longer half-life than intravenous.” Similarly, the estate’s expert cardiologist, Lewis, testified that the evidence showed that the injection of Dilaudid was massive and he opined that there was likely still “some Dilaudid in the cerebral spinal fluids pressing [Marie Heisey’s] drive to breathe” on the day she died. Cassin too testified that a blood test taken after Marie’s death might not reveal the presence of Dilaudid: “Because the Dilaudid could very well still be in the central nervous system without being in the circulating blood.”

And Ries testified that “it’s known that if the medication is given through the spinal canal intrathecally, that it may last for a longer period of time.”

On the totality of the record, there was sufficient evidence from which the trial court could reasonable conclude that Laurito’s opinions were founded on reliable principles and methods and that he reliably applied the principles and methods to the facts of the case. MRE 702; MCL 600.2955(1). Because Laurito’s opinion met the requirements of MRE 702 and MCL 600.2955(1), the trial court did not abuse its discretion when it determined that Laurito could present his opinion to the jury. *Gay*, 295 Mich App at 290. For the same reason, the trial court did not err when it denied Yovino, Burke, and Henry Ford Hospital’s motion for JNOV premised on their belief that Laurito’s opinion was unreliable and inadmissible.

IV. KIM’S DEPOSITION

A. STANDARD OF REVIEW

Yovino, Burke, and Henry Ford Hospital next argue the trial court erred when it permitted Kim’s deposition to be read into the record. Specifically, they maintain, the trial court should not have allowed the admission of Kim’s opinion that some of the Dilaudid must have been injected into Marie Heisey’s intrathecal space because Kim himself admitted that his theory was pure speculation. This Court reviews a trial court’s evidentiary decisions for an abuse of discretion. *Edry*, 486 Mich at 639. A trial court abuses its discretion when it selects an outcome that is outside the range of reasonable and principled outcomes. *Id.*

B. ANALYSIS

The estate sought the admission of Kim’s deposition testimony at trial and the trial court allowed select pages to be read to the jury. In the parts that were read, Kim expressed his opinion that the pain pump could not be overfilled. He also stated that the only thing that accounted for the facts was “that somehow this drug got pushed through the pump and into the intrathecal space.” Kim explained that an intramural or intravenous injection could not have caused Marie Heisey’s kind of respiratory depression:

But the depth of respiratory depression she had that lasted 48 to 72 hours cannot be explained by IM [intramural] dosing. That’s the bottom line. Okay.

It can be explained by the fact that she got a small amount intrathecally. Okay. I cannot tell you—you know, it depends on the absorption IM, everything else, but intrathecally, I think she definitely got something—

* * *

. . . I’m just saying that 13 cc’s IM, right, would not cause—it might have given her some—it might have given her some pinpoint pupils, I don’t know. Okay. But like I said, the length of time it took for her to have respiratory depression, I can only explain that by intrathecal dosage. . . .

Kim could not explain how an intrathecal infusion occurred during the refill, but he speculated that the Dilaudid might have come from the reservoir: “The only way I can explain it, somehow it actually did go from the reservoir, through the catheter, into the intrathecal space.”

A fair reading of the testimony shows that Kim’s opinion that there must have been an intrathecal infusion of Dilaudid was not founded on speculation; it was the only conclusion that explained Marie Heisey’s immediate respiratory distress. To the extent that his opinion involved speculation, he speculated about the mechanism by which the Dilaudid ended up in her intrathecal space. He did not apparently consider it an option that his staff—Kedzierski and Yovino—might have injected the Dilaudid into the wrong port. So he opined that it must have been the result of a mechanical failure. Nevertheless, because Kim’s opinion concerning the only explanation for the immediacy of Marie Heisey’s reaction was not speculation, the trial court did not err when it refused to exclude the testimony on that basis. MRE 702; *Edry*, 486 Mich at 639.

V. CAUSATION AND STANDARD OF CARE

A. STANDARD OF REVIEW

Yovino, Burke, and Henry Ford Hospital note that, prior to trial, Laurito withdrew his opinion that Yovino caused or supervised the overfilling of the pain pump or the injection of Dilaudid directly into the space around the pain pump. Because the estate was no longer arguing that Yovino caused or supervised the injection of Dilaudid outside the pump, the trial court should have directed a verdict on that theory or precluded the estate’s lawyer from arguing it to the jury. In the alternative, the trial court should have directed a verdict on the claim that Yovino breached her duty to properly supervise Kedzierksi because the estate failed to present any evidence concerning the standard of care applicable to a physician’s assistant, which was necessary to establish that Yovino negligently supervised Kedzierski.

This Court reviews a trial court’s decision to expand or limit the theories of liability that a party may present to the jury for an abuse of discretion. *Dacon v Transue*, 441 Mich 315, 327-329; 490 NW2d 369 (1992). This Court reviews de novo whether the trial court properly applied the common law to the causes of action raised at trial. *Brecht v Hendry*, 297 Mich App 732, 736; 825 NW2d 110 (2012).

B. ALTERNATE CAUSATION THEORY

During the early stages of this litigation, the estate alleged two theories of liability against Yovino: that she negligently caused or supervised the overfilling of Marie Heisey’s pain pump or that she negligently caused or supervised an injection of Dilaudid directly into Marie Heisey outside the pain pump. Laurito initially agreed that the evidence supported these theories, but as discovery progressed, Laurito altered his opinion. First, the parties had the pain pump tested by the manufacturer and agreed that the pump was functioning properly at the time of the refill. Because the pain pump could not be overfilled, Laurito withdrew that theory as a possible cause. Second, Laurito determined that the injection of Dilaudid outside the pump and into Marie Heisey did not fit the evidence concerning the immediacy and severity of her reaction. Instead, he concluded that the evidence could only be explained if the injection was intrathecal, which

could only occur with a properly functioning pump if the person performing the refill negligently accessed the catheter access port rather than the center reservoir. Laurito revised his opinion accordingly.

After Laurito revised his opinion, Yovino, Burke, and Henry Ford Hospital filed a motion to prevent the estate from presenting this new theory and also asked the trial court to dismiss the estate's claims premised on a negligent overfill or injection outside the pump. They asked the trial court to enforce this limitation on the ground that the new theory was not pleaded in the complaint and the other theories had been withdrawn. The estate responded by moving for permission to amend its complaint to include the new theory. The trial court agreed that the estate could not argue that the pump was overfilled, but granted the estate's motion to amend the complaint to include the new theory. The trial court, however, refused to preclude the estate from presenting evidence or arguing that it would be malpractice to inject Dilaudid directly into a patient outside the pain pump during a refill procedure.

The estate filed a second amended complaint that no longer included allegations that Kedzierski or Yovino overfilled the pain pump or injected the Dilaudid outside the pain pump. Instead, the estate alleged that Yovino negligently caused or supervised the injection of Dilaudid into the catheter access port.

Yovino, Burke, and Henry Ford Hospital never contested the fact that Marie Heisey received a toxic dose of Dilaudid on the day that Kedzierski and Yovino attempted to perform the refill. They merely maintained that there was no way to determine how she received the toxic dose. However, after the parties received the report from the pump's manufacturer and agreed that the pump was working properly and could not be overfilled, there remained only two possible causes for the toxic dose: either Kedzierski injected the Dilaudid into Marie Heisey outside the pump or he injected it into the wrong port on the pump. Yovino, Burke, and Henry Ford Hospital were, therefore, by the time of trial, on notice that the trial would involve evidence that Kedzierski and Yovino improperly conducted the refill procedure and caused Marie Heisey to receive a toxic dose of Dilaudid. Indeed, the trial court recognized that the primary issue at trial was not whether Yovino breached the standard of care when she participated in the procedure causing the overdose, but whether the overdose caused Marie Heisey's death. Consequently, this case did not involve a situation where the defense lacked sufficient notice of the plaintiff's theory of liability or the issues to be tried such that it was fundamentally unfair to allow the issues to be raised at trial. See *Dacon*, 441 Mich at 333-336.

At trial, the estate presented evidence and consistently maintained that the evidence showed that Yovino either caused or supervised the negligent injection of Dilaudid directly into the catheter access port, which ultimately caused her death. It did not argue that Yovino negligently caused or supervised an injection outside the pump.

By contrast, Yovino, Burke, and Henry Ford Hospital presented testimony and argued that a patient might receive a toxic overdose of medicine during a pain pump refill without it being the result of a breach of the standard of care. In order to refute that position, the estate's lawyer elicited testimony and argued in closing that, even if the facts demonstrated that the Dilaudid was injected outside Marie Heisey's pain pump, causing or supervising the injection of Dilaudid directly into a patient outside the pain pump would constitute malpractice. Hence, the

record shows that the estate did not present this as its primary theory concerning Yovino's breach, but rather as a refutation of the defense's position that Yovino could cause or oversee an overdose without it constituting a breach of the standard of care.

Yovino, Burke, and Henry Ford Hospital had ample notice that the trial court would allow the estate to elicit testimony concerning the propriety of an injection outside the pain pump should that issue arise at trial. Consequently, they cannot now claim that permitting the estate to elicit testimony and argue that issue deprived them of a fair trial.

The trial court did not abuse its discretion when it refused to limit the scope of the estate's proofs and arguments concerning the propriety of an injection outside the pain pump at trial. *Id.* at 327-329.

C. STANDARD OF CARE FOR PHYSICIAN'S ASSISTANTS

Yovino and Henry Ford Hospital finally argue that the estate had to establish that Kedzierski breached the standard of care applicable to a physician's assistant in order to establish his claim that Yovino negligently supervised Kedzierski during the procedure. Because the estate did not present any testimony to establish the standard of care applicable to a physician's assistant, they further maintain, the trial court should not have permitted the negligent supervision claim to be submitted to the jury.

In Michigan, a supervising physician has a non-delegable duty to ensure that the procedures conducted under his or her supervision are performed with due care. *Orozco v Henry Ford Hosp*, 408 Mich 248, 253; 290 NW2d 363 (1980). Thus, although the estate had to establish that Kedzierski took some action that harmed Marie Heisey, it did not have to plead or prove that Kedzierski breached the standard of care applicable to a physician's assistant in doing so—that is, it did not have to prove that Kedzierski was negligent. See *McCullough v Hutzell Hosp*, 88 Mich App 235, 239 n 1; 276 NW2d 569 (1979); see also *Bailey*, 304 Mich App slip op at 12-14 (explaining the difference between direct liability for one's own torts and indirect liability for a tort committed by another). Rather, it only had to plead and prove that, had Yovino acted with the requisite skill and care, she would have prevented Kedzierski from improperly performing the procedure. *McCullough*, 88 Mich App at 239 n 1.

The trial court did not err when it submitted the estate's negligent supervision claim to the jury.

C. CONCLUSION

The defense conceded that Marie Heisey received a toxic dose of Dilaudid during the refill procedure and was on notice that the mechanism by which that overdose occurred and whether it was the result of malpractice was at issue. Moreover, the estate had the right to address that issue to the extent that Yovino, Burke, and Henry Ford Hospital argued that Marie Heisey could have had a toxic overdose of Dilaudid even without malpractice during the refill. For these reasons, the trial court did not err by permitting the estate to elicit testimony and argue that injecting Dilaudid outside a pain pump would constitute negligence even though that was no longer the estate's primary theory of liability.

The estate also did not have to prove that Kedzierski breached the standard of care applicable to physician's assistants in order to prove that Yovino breached the standard of care applicable to her as a supervising physician. Consequently, the trial court did not err when it submitted the estate's negligent supervision claim to the jury.

VI. GENERAL CONCLUSION

There were no errors warranting relief.

Affirmed. As the prevailing party, the estate may tax its costs. MCR 7.219(A).

/s/ Mark J. Cavanagh

/s/ Donald S. Owens

/s/ Michael J. Kelly