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United States Court of Appeals
Tenth Circuit

April 11, 2023

Christopher M. Wolpert
Clerk of Court

PUBLISH

UNITED STATES COURT OF APPEALS

FOR THE TENTH CIRCUIT

UNITED STATES OF AMERICA,

Plaintiff - Appellee,

v.

NATHAN PEHRSON,

Defendant - Appellant.

No. 21-4133

Appeal from the United States District Court
for the District of Utah
(D.C. No. 2:19-CR-00010-HCN-1)

Freyja Johnson, The Appellate Group, Bountiful, Utah, for Defendant-Appellant.

Jennifer P. Williams, Assistant United States Attorney, Salt Lake City, Utah (Trina A. Higgins, United States Attorney, with her on the brief), for Plaintiff-Appellee.

Before **HOLMES**, Chief Judge, **MURPHY** and **HARTZ**, Circuit Judges.

HARTZ, Circuit Judge.

Defendant Nathan Pehrson was convicted on charges of diverting hydromorphone, a synthetic opioid commonly known as Dilaudid, while working as a nurse in a surgical trauma unit at Intermountain Medical Center in early 2018. Defendant appeals his conviction, arguing that the district court erred in allowing

expert witness Dr. Ryan Paulsen to testify that the drug test on Defendant's hair indicated that he had most likely ingested hydromorphone, and in allowing Dr. Richard Cox, who was not qualified as an expert, to give opinion testimony regarding Defendant's diversion of the drug from its intended use for patients.

Exercising jurisdiction under 28 U.S.C. § 1291, we affirm Defendant's conviction. The district court did not abuse its discretion in admitting the testimony of Dr. Paulsen and any error in allowing the opinion testimony of Dr. Cox was harmless.

I. BACKGROUND

Unless otherwise indicated, the following discussion is taken from the testimony at trial.

A. Intermountain's Investigation

In March 2018 Intermountain's system for controlling and tracking medication generated a report flagging Defendant for suspicion of diverting narcotics from their proper use at the Intermountain hospital. The system works as follows:

Intermountain uses Automatic Dispensing Machines (ADMs) to store drugs on the hospital floor. ADMs are drawered cabinets connected to a computer system; they enable nurses to easily access drugs ordered for patients. Before a nurse can remove a drug from the ADM, the nurse must log into the computer, select the patient, and select the drug to be dispensed for that patient. The ADM will allow a nurse to access a drug if the drug has been ordered for the patient by a physician.

After a drug has been selected, the ADM unlocks the appropriate drawer, which contains a number of medications in individual locked "pockets," and unlocks the pocket containing that drug. Each controlled substance (such as a narcotic) must be in its own dedicated pocket, and when a controlled substance is dispensed, the ADM requires the nurse to count and input the number of doses of that drug in the pocket. The count is used to verify that the number of doses in the pocket matches the expected number; if the count does not match the expected number, someone may have removed a dose without recording it. For drugs requiring refrigeration, like hydromorphone syringes, the pocket contains a key to a nearby lockbox inside a refrigerator where the drugs are stored.

When the number of doses of a drug in the ADM drops under a set limit, the ADM will automatically notify the pharmacy that a restock is needed. And if an ADM does run out of a drug, pharmacy technicians, who are on duty around the clock, are instructed by hospital policy to restock the drug within 15 minutes of being notified of the need. One testified that "it wasn't very often . . ., if ever" that it took more than 15 minutes to restock. Aplt. App., Vol. II at 240.

All ADM transactions are recorded when the drawer closes. The records reflect wastes, returns, and canceled transactions. A waste occurs when a portion of a drug is discarded. Many intravenous drugs, including hydromorphone, are dispensed in small vials or syringes, and often the ordered dose is less than an entire vial or syringe. Hospital policy instructs the nurse to prepare the appropriate dose and then immediately "waste the remainder of the vial into a waste bin with a witness." *Id.* at

68. A return occurs when the dispensed drug is not administered to the patient (for example, the patient may refuse the drug) and the unopened drug is returned to the ADM. A canceled transaction occurs when a nurse begins the process of retrieving a drug to the point where the pocket is opened (giving the nurse access to the drug inside) but then cancels the process without removing anything from the ADM. Cancellations are infrequent but may legitimately occur if the system times out or a drawer accidently closes. For a drug whose ADM pocket contains only a key, a nurse may have to use a canceled transaction to return the key if the ADM closes the pocket without the key inside (as when the ADM times out or is inadvertently bumped). Intermountain has implemented its system in compliance with government regulations. For controlled substances like hydromorphone, the hospital is required to keep "a chain of custody"—that is, a complete accounting of the drug "from the time [it is received] from the wholesaler to the time it's either used on a patient or wasted or destroyed." *Id.* at 73.

The ADM records are analyzed by Intermountain's Automated Decision Support (ADS) system to detect potential diversion of controlled substances. The ADS system compares the dispensing, wasting, and returning behavior of each nurse to that of peer nurses working in the same area of the hospital. The system scores each nurse for potential diversion, and Intermountain reviews the scores every week. If a nurse's score is above a set threshold, Intermountain will open an investigation. Intermountain's records system also allows the creation of reports that combine a 180-day history of all the ADM transactional data with the associated patient data.

Dr. Richard Cox, Intermountain's Assistant Director of Pharmacy, was responsible for reviewing the ADS reports. In March 2018 he saw that the system had identified Defendant for possible diversion, because Defendant was "dispensing hydromorphone, the .5 milligram dose, the hydromorphone 1 milligram dose, and the Morphine 4 milligram dose . . . [at] twice the total quantity as colleagues over a similar period of time." *Id.* at 132. Dr. Cox therefore manually reviewed Defendant's dispensing records. Concerned by what he saw in the data, Dr. Cox notified Dr. DeVere Day, Intermountain's pharmacy automation and technology manager and a member of Intermountain's diversion task force. Dr. Day performed an independent investigation into Defendant's dispensing behavior and identified many of the same red flags identified by Dr. Cox.

Dr. Day and Dr. Cox testified at trial about their investigations and concerns. Dr. Day said that improper conduct generally cannot be demonstrated by a report of a single ADM transaction. He explained that a surgical trauma nurse like Defendant has some discretion in selecting the drug and dosage for treating a patient's pain and changing drug or dosage in response to the patient's condition. For example, a physician may instruct the nurse to start with a lower dose and adjust the dosage based on the patient's response, or a physician may order multiple pain drugs and allow the nurse to choose the best option depending on the level of the patient's pain. Given this discretion, the telltale sign is repeated conduct. Dr. Day testified that the "number one indicator of diversion is access to medication and number of times it's accessed or number of doses dispensed." *Id.* at 139. In addition, the manual reviews

by Drs. Cox and Day of the 180-day data revealed significant anomalies in Defendant's practices. For example, Dr. Day testified:

> [W]e would see instances where [patients] were not requiring IV pain medications. [Defendant's] shift would begin and he would suddenly -- those patients would have IV pain medications charted and then, subsequently, they would not. Or we would see patients who were not getting any IV pain medications, he would come on shift, they would get doses charted and then they would not require it afterward. So again, when we compare against other nurses taking care of the same patients, we saw instances that he seemed to be different.

Id. at 133–34.

The reports also indicated that Defendant was carrying drugs on his person for extended periods of time. Dr. Cox testified that instead of dispensing, immediately wasting the excess, and then administering to the patient—as required under hospital policy—Defendant would "dispense some hydromorphone and then, hours later, come back and waste, and then administer it to the patient." *Id.* at 67. According to Dr. Day, the reports showed delays "frequently greater than 60 minutes, often an hour and a half, [and] a couple of instances much longer than that, which means he was carrying waste on his person for a period of time." *Id.* at 132. Dr. Day testified that carrying around controlled substances provided an opportunity to divert the waste.

Defendant also had a high number of returns compared to his nurse peers and, particularly in the last few weeks before his termination, a high number of cancelations. Dr. Day testified that canceled transactions provide an "opportunity for tampering and manipulating a particular medication," *id.* at 165, and that although he

saw canceled transactions from other nurses in Defendant's unit, it was "nothing [compared] to the frequency for which we noticed from [Defendant] and the hydromorphone," *id.* at 166–67.

At trial Defendant challenged the hospital's investigation, contending that the 180-day report of ADM transactions from September 3, 2017, to March 1, 2018, showed a peer nurse dispensing about as much hydromorphone as Defendant. Defense counsel also introduced evidence that the number of times that Defendant wasted hydromorphone was in line with his peers. But Dr. Cox testified that Defendant's behavior was not flagged by the ADS system until March 2018, and Dr. Day testified that his investigation, in early April, noticed a spike in the amount of hydromorphone dispensed by Defendant. (The 180-day report ending on April 5, 2018, showed that Defendant was dispensing about twice as much hydromorphone as his peer nurses during that period.) And Dr. Day explained that the concerns about Defendant's wasting were based on the length of time he carried the drug before wasting and on the quantity of drug wasted, not the number of waste events.

Based on Dr. Cox's and Dr. Day's findings, the Intermountain diversion task force decided to pull Defendant from his shift on the evening of April 13, 2018, so hospital administrators could discuss their concerns with him. Before meeting with Defendant, the task force monitored his ADM use during the shift and allowed him to access one dose of his apparent drug of choice—hydromorphone. At 8:55 p.m. Defendant used the ADM to dispense one syringe of hydromorphone, and a little over an hour later, he returned a hydromorphone syringe to the ADM.

During the hour between Defendant's dispensing and return of the syringe, another nurse dispensed a hydromorphone syringe from the ADM. That nurse entered the correct count, which indicated that Defendant had removed only a single syringe from the ADM. At trial the nurse testified that he examined the syringe for tampering before giving the drug to the patient and that he would have remembered if it had not made the customary cracking sound when he removed the outer cap.[1] For the criminal investigation by the Food and Drug Administration (the FDA), the nurse agreed to have his hair tested for drugs and it tested negative for hydromorphone.

About 25 minutes after Defendant returned the hydromorphone syringe to the ADM, he was brought into a meeting with five Intermountain personnel. Dr. Day explained to him that Intermountain's diversion-detection system had identified him for suspected diversion, although he added that "just because the analytical tool shares there's a possibility, this doesn't prove that there's diversion." *Id.*, Vol. III at 27. Dr. Day then went through each of the warning signs that he had discovered, and asked Defendant if he could explain his behavior. Defendant responded that he only wanted to make sure his patients were comfortable and that he carried drugs around because sometimes there were issues getting hydromorphone doses from the ADM.

[1] The hydromorphone syringes in the ADM did not have needles, as the drug was generally administered by screwing the syringe into a patient's IV. Each of the syringes had a tamper-evident outer cap that had to be removed before the syringe could be used. As one nurse testified at trial, when you remove the outer cap "it makes kind of a cracking noise like a water bottle does," and if a nurse "ever encountered a syringe that didn't crack, it was kind of our protocol to bring that to the attention of our charge nurse and the pharmacy." Aplt. App., Vol. III at 111–12.

At the meeting Dr. Day confirmed that there were times that an ADM would be out of hydromorphone. And Defendant admitted to violating hospital policy by holding onto drugs for longer than he should have. Defendant also volunteered to have his locker searched.

Defendant asked to see the dispensing data, but Dr. Day did not provide it because it contained information about patients and other employees. Defendant was then asked to take a drug test. He refused. He was told that the drug test was required as a condition of maintaining his employment, and he still refused. He then said he would take the drug test if all the other nurses on the floor were tested but that he wanted to speak with a lawyer before taking a drug test. Camisha Chadwick, the representative of the human-resources department at the meeting, testified that Defendant was defensive, uncooperative, and argumentative throughout.

Because Defendant was suspected of diverting a controlled substance, he was not permitted to drive himself home and his wife was called to pick him up. Before leaving, Defendant and his wife met with Ms. Chadwick and again demanded Dr. Day's data; the couple also threatened to sue Intermountain. Defendant's wife testified that she asked Intermountain to allow Defendant to take a drug test at an outside laboratory and that Intermountain refused. On April 19, Defendant was fired for cause for refusing to take a drug test and for suspected diversion.

While Defendant was in the meeting, the pharmacy director had all the hydromorphone syringes accessed by Defendant removed from the ADM. Six hydromorphone syringes were removed and brought to the pharmacy. After the

meeting, Intermountain staff members examined these syringes; it appeared to them that some of the tamper-resistant outer caps had been removed and replaced in a way that would not be immediately obvious to another nurse. Intermountain contacted law enforcement to report suspected tampering.

B. The FDA investigation

On April 17 Special Agent Virginia Keys of the Office of Criminal Investigations of the FDA met with Intermountain staff. She discussed with them their concerns regarding Defendant and took possession of the six syringes that had been removed from the ADM on April 13. An FDA laboratory examined the syringes and found that five of the six had clear indications of tampering and that four contained less than 15% of the hydromorphone indicated on the label. The laboratory also concluded that if hydromorphone had been removed from those four syringes, it had been replaced with saline solution. Agent Keys testified that those who want to divert a controlled substance from a syringe may refill the syringe with saline solution after removing the drug. Evidence at trial showed that the six hydromorphone syringes had been stocked in the ADM the night before and had been accessed by other nurses before being accessed by Defendant. On cross-examination the FDA forensic scientist who had examined the syringes admitted that she could not say when the syringes had been tampered with.

On June 18, 2018, just over two months after Defendant's final shift, Agent Keys served a search warrant on Defendant to collect hair to test for opioids. A patch of Defendant's hair was cut from the base of his scalp; the sample was 2.6

centimeters long. Expert witness Dr. Paulsen testified at trial that this was "approximately two months of growth," so testing would indicate which—if any—drugs were in his system during the prior two months. *Id.*, Vol. IV at 40. Agent Keys testified that officers examined Defendant's body and found no track marks from drug injections. She also said that Defendant gave permission to search his house and they found no illicit drugs or drug paraphernalia. After the search, Defendant agreed to speak with Agent Keys. He told her that he had never diverted drugs and had never taken drugs without a prescription.

As part of her investigation, Agent Keys reviewed Defendant's medical records and found that he had been prescribed a two-day dose of hydrocodone in June 2017. At trial, Defendant's wife testified that Defendant was prescribed opioids, including hydrocodone, for pain resulting from kidney stones and back surgery, and that he took them sporadically as needed. But during his questioning by Agent Keys, Defendant did not mention taking hydrocodone or any other prescribed opioid and did not mention his kidney stones. The only prescription drug he mentioned was Prozac, which he used for anxiety and depression.

The samples of Defendant's hair tested positive for the presence of hydromorphone. FDA chemist Dr. Rick Flurer testified that drugs enter the hair through the blood supply and can be detected in the hair for at least a year if the hair is normally managed. But he could not say when or how the hydromorphone came to be in Defendant's system.

On January 9, 2019, Defendant was indicted by a grand jury in the United States District Court for the District of Utah on three counts: tampering with consumer products in violation of 18 U.S.C. § 1365; fraudulently obtaining a controlled substance in violation of 21 U.S.C. § 843(a)(3); and making a false statement or representation to a department or agency of the United States in violation of 18 U.S.C. § 1001.

C. Psychemedics' Testing

The FDA tested Defendant's hair only for hydromorphone, and the FDA's analysis indicated the presence of the drug but not the concentration. To obtain more precise information, the government sent two samples of Defendant's hair to Psychemedics Corporation, a commercial laboratory specializing in detecting drugs in hair, for additional testing using liquid chromatography with tandem mass spectrometry (LC-MS/MS). Psychemedics tested the samples for codeine, morphine, 6-MAM (an opioid indicating the ingestion of heroin), hydrocodone, hydromorphone, and oxycodone, reporting the results in nanograms per 10 milligrams of hair. (All concentrations of opioids discussed in this opinion are per 10 mg of hair.) Defendant's first sample contained concentrations of 1.92 ng of hydrocodone, 0.60 ng of hydromorphone, and 7.72 ng of oxycodone; and his second sample contained 1.81 ng of hydrocodone, 0.60 ng of hydromorphone, and 7.74 ng of oxycodone.

The presence of hydrocodone in the samples complicated the analysis. Hydromorphone—the opioid in the syringes at Intermountain—is a metabolite of hydrocodone—the opioid for which Defendant had a prescription. This means that

hydromorphone is produced in the body by the chemical breakdown of hydrocodone. *See Burrage v. United States*, 571 U.S. 204, 207 (2014) ("A metabolite is a product of metabolism, or . . . what a drug breaks down into in the body." (citation and internal quotation marks omitted)). As a result, individuals can have both hydrocodone and hydromorphone in their bodies from ingesting only hydrocodone. In this light, it became more relevant that Defendant had at one time been prescribed hydrocodone.

D. Dr. Paulsen's Testimony and Defendant's *Daubert* Challenge

To show that at least some of the hydromorphone in Defendant's hair samples was from the ingestion of hydromorphone rather than from the metabolization of prescribed hydrocodone, the prosecution relied on the expert testimony of Dr. Ryan Paulsen, the senior analytical chemist for mass spectrometry at Psychemedics. In December 2019 the prosecution filed a notice that Dr. Paulsen would testify that based on the ratio between the amounts of hydromorphone and hydrocodone in Defendant's samples, there was "a very high probability that the Defendant had hydromorphone introduced into his system separately from hydrocodone." Aplt. App., Vol. I at 38. The notice informed Defendant that Dr. Paulsen's opinion relied on a study titled "A Retrospective Analysis of Selected Opioids in Hair of Workplace Drug Testing Subjects," which Dr. Paulsen had co-authored and was published in the *Journal of Analytical Toxicology* in 2019. The study analyzed over 3,000 hair samples containing both hydromorphone and hydrocodone to determine the typical ratio between the two. The study found that 57% of the analyzed samples had a

hydromorphone-to-hydrocodone ratio of 1-2%, and 97% of the samples had a ratio less than 10%. The two hair samples from Defendant each had a ratio over 30%—which was higher than 99.5% of the samples analyzed in the study.

In July 2021 Defendant filed a motion in limine to exclude Dr. Paulsen's testimony on Defendant's drug test.[2] The motion asserted that Psychemedics' normal practice is to use a 2.0 ng cutoff for confirming a positive opioid test, meaning that it reports a positive test for an opioid if the LC-MS/MS analysis finds more than 2.0 ng of that opioid in the sample.[3] Defendant argued that because his samples only had 0.6 ng of hydromorphone, which was below the 2.0 ng cutoff, the testing was unreliable and inadmissible at trial.

Shortly thereafter, the district court held a *Daubert* hearing on Defendant's motion. *See Daubert v. Merrill Dow Pharms., Inc.*, 509 U.S. 579 (1993). At the start of the hearing, counsel for Defendant told the court that he was arguing only "whether the results themselves are high enough to confirm a confirmation of hydromorphone vers[u]s a metabolite of hydrocodone." Aplt. App., Vol. I at 162. He

[2] Defendant's motion also challenged Dr. Flurer's testimony regarding the results of the FDA's testing of his hair samples. The district court denied the motion as to Dr. Flurer and Defendant does not challenge that ruling on appeal.

[3] The Mandatory Guidelines for Federal Workplace Drug Testing Programs developed by the Department of Health and Human Services define *cutoff* as "[t]he analytical value (*e.g.*, drug or drug metabolite concentration) used as the decision point to determine a result (*e.g.*, negative, positive, adulterated, invalid, or, for urine, substituted) or the need for further testing." 82 Fed. Reg. 7920, 7938 (Jan. 23, 2017).

explained that "our challenge is purely to the cutoff levels, and we believe without established cutoff levels being met that they're not reliable." *Id.*

Dr. Paulsen testified at the hearing. He offered his credentials as an expert and explained the testing procedure used to analyze Defendant's hair samples. He stated that each of Defendant's samples had been tested twice and that the results from the two samples were consistent with each other. Dr. Paulsen then discussed the published study he had co-authored, upon which he relied for his opinion that Defendant had ingested hydromorphone. He explained:

> [O]ur laboratory published an article in the *Journal of Analytical Toxicology*, it's a peer-reviewed article, in which we did a statistical analysis of about 3,000 samples that had been found in the course of our work to contain both hydrocodone and hydromorphone, and we were able to establish what a typical profile would be in terms of the relative concentrations.

Id. at 182. He said that the sample size in the study was large enough to reach reliable conclusions and that the study showed that the "typical concentration ratio" between hydromorphone and hydrocodone "would be between two to three percent hydromorphone relative to hydrocodone." *Id.* at 183.

Dr. Paulsen said that Defendant had a hydromorphone-to-hydrocodone ratio of over 30%, which was higher than 99.5% of the samples in the study. He concluded that "it would be an extreme statistical outlier to see that kind of relative concentration for the ingestion of hydrocodone alone," and therefore it was "more likely" that Defendant's hydromorphone-to-hydrocodone ratio was caused by "the ingestion of both hydrocodone and hydromorphone." *Id.* Indeed, the study itself said

that the samples with a high percent of hydromorphone were "possibly an artifact of separate [hydromorphone] ingestion by some subjects." *Id.* at 90.[4]

When Dr. Paulsen was asked about the 2.0 ng cutoff used by Psychemedics for reporting positive tests, he explained that it was an interpretive tool used by the laboratory; if the concentration of the drug reached that level, one can conclude that there were "multiple ingestions of the drug in question over the timeframe indicated by the length of the hair." *Id.* at 188. But, he said, those were "different conclusions and extrapolations" from what he was testifying about regarding Defendant, which was simply that the drug hydromorphone was present in his hair at the indicated concentrations. *Id.* at 187–88. When asked if the 2.0 ng cutoff would also indicate whether the drug was a metabolite, he said it would not, explaining that if a sample had 100 ng of hydrocodone and 3 ng of hydromorphone, both drugs would be above the cutoff, but the 3% hydromorphone-to-hydrocodone ratio would suggest that the hydromorphone was a metabolite.

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[4] Dr. Paulson did not testify to this possibility at the *Daubert* hearing, but at trial he made this point, saying:

> [I]n the study in question, we had no way of distinguishing people who were taking both drugs because we don't have medical histories on these individuals. What we had were the results determined by the lab. And so taking a large population of individuals, which might include people with unusual metabolism, but might also include people who are taking both hydrocodone and hydromorphone, in that whole population, only 1 out of 200 would have a percentage of hydromorphone relative to hydrocodone higher than 30 percent.

Aplt. App., Vol. IV at 45–46.

Dr. Paulsen stated that the relevant thresholds for his conclusions about Defendant's hair were the limit of detection—that is, the threshold above which his laboratory could identify the drug (which was set at 0.5 ng)—and the limit of quantification—that is, the threshold above which his laboratory could accurately quantify the concentration of the drug (which was also 0.5 ng).[5] Dr. Paulsen testified that so long as an opioid concentration is above these limits, Psychemedics' laboratory is "able to accurately and unambiguously identify it and quantify it." *Id.* at 184. (At trial he added that given the length of Defendant's hair sample—which represented growth for about two months, the time since he was fired—the concentrations of opioids found in the samples would be consistent with someone being cut off from hydromorphone about two months before sample collection.)

Defense counsel asked Dr. Paulsen about the error rate in Psychemedics' testing. Dr. Paulsen stated that there was "an uncertainty of measurement," but he did not know what the specific figures were. He explained that "as part of the validation of these methods, you have to meet certain precision requirements" for all measurements above the limit of detection and quantification, but he did not know what the uncertainty was for measurements of 0.6 ng. *Id.* at 192–93. He did say that

[5] The Mandatory Guidelines define *limit of detection* as "[t]he lowest concentration at which the analyte (*e.g.*, drug or drug metabolite) can be identified," and define *limit of quantification* as "[f]or quantitative assays, the lowest concentration at which the identity and concentration of the analyte (*e.g.*, drug or drug metabolite) can be accurately established." 82 Fed. Reg. at 7939.

the uncertainty or variation was not as high as 0.5 ng, because then the laboratory would be unable to validate its results.

The district court allowed supplemental briefing to give the parties an opportunity to respond to the testimony at the *Daubert* hearing. Defendant's supplemental brief renewed his argument that Dr. Paulsen's testimony was unreliable because Defendant's hydromorphone concentrations were below the 2.0 ng cutoff used to report positive drug tests, and he also noted that Dr. Paulsen had been unable to state at the *Daubert* hearing the error rate for Psychemedics' testing of Defendant's samples.[6]

At the start of trial the district court denied Defendant's motion in limine in an oral ruling. The court first considered Defendant's argument that Dr. Paulsen's opinion was unreliable because the concentration of hydromorphone was below Psychemedics' 2.0 ng cutoff. The court explained:

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[6] The supplemental brief also argued for the first time that Dr. Paulsen's testimony was unreliable because Defendant's hydromorphone concentrations were too low to have been included in the published study. This argument was based on the description in the study of the immunoassay screening test used to select samples suitable for the study. The screening test was a relatively inexpensive way to eliminate hair samples not containing opioids, although it would also eliminate some samples containing lower concentrations of opioids that could be quantified with the more sophisticated techniques used for the study. Thus, even if a sample failed the screening test, it would not mean that the more sophisticated testing done in the study would be unable to accurately measure opioids in that sample. In any event, Defendant has explicitly declined to pursue this argument on appeal, perhaps because trial testimony indicated that Defendant's hair samples probably would have survived the screening because of the presence of opioids other than hydromorphone. We therefore need not address the merits of the argument. *See United States v. Springfield*, 337 F.3d 1175, 1178 (10th Cir. 2003) (A "claim raised in district court but not briefed on appeal is waived.").

> Dr. Paulsen acknowledges that he cannot "draw as many conclusions about drug consumption" from concentrations below the [2.0 ng] cutoff level. But because all of the samples showed concentrations above the level of detection, Dr. Paulsen can definitively testify that "the drug is there" in the sample, and he can also identify the amount of both the hydromorphone and the hydrocodone in the sample. And because Dr. Paulsen does not seek to testify directly regarding "drug consumption" but only regarding whether the concentration ratio between hydrocodone and hydromorphone in Mr. Pehrson's hair sample is consistent with ingestion of only prescription hydrocodone, the lack of concentrations above the cutoff level does not make Dr. Paulsen's testimony unreliable.

Id., Vol. II at 18–19 (citations omitted).

The district court then addressed whether the concentrations of opioids in Defendant's samples were too low to have been included in the published study co-authored by Dr. Paulsen. The court correctly noted that the section of the study analyzing hydromorphone-to-hydrocodone ratios "did exclude hydrocodone samples that were below 2 nanograms per 10 milligrams of hair, and Mr. Pehrson's two samples had 1.92 and 1.81 nanograms of hydrocodone per 10 milligrams." *Id.* at 19. But the court said that "the fact that the concentrations of hydrocodone in Mr. Pehrson's hair samples were slightly below the minimum concentrations of samples included in the study does not make Dr. Paulsen's testimony unreliable. At most, this fact makes the testimony somewhat shaky." *Id.* (The court's use of the term *shaky* appears to be taken from the sentence in *Daubert* that states: "Vigorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence." 509 U.S. at 596; *see also* Fed. R. Evid. 702 advisory committee's note to 2000 amendment (quoting the sentence from *Daubert*).) The district court did not

discuss Dr. Paulsen's failure to state the error rates but said that "Dr. *Flurer's* failure to identify or quantify an established error rate makes his testimony shaky, it does not make it unreliable." Aplt. App., Vol. II at 14 (emphasis added). We can assume that the court implicitly reached the same conclusion with respect to Dr. Paulsen's testimony.

The court ruled that "Mr. Pehrson's arguments establish that Dr. Paulsen's testimony is not 100 percent conclusive and is subject to some qualifications and limitations. But none of this renders the testimony unreliable within the meaning of [Federal] Rule [of Evidence] 702. Rather, Mr. Pehrson has identified issues that he can address through rigorous cross-examination." *Id.* at 21.

E. The Trial

Most of the relevant trial testimony has already been summarized. Here, we focus on only a few additional points.

First, we provide the context for Defendant's challenge to the opinion testimony of Dr. Cox. During cross-examination of Dr. Cox, defense counsel elicited his concession that the diversion-detection software does not prove diversion and suggested that Defendant's actions could have been entirely innocent. One exchange proceeded as follows:

> **Q.** The machine gave you red flags that caused you concern; correct?
> **A.** Yes.
> **Q.** Machines and computer programs can make false [sic]; correct?
> **A.** Yes. And that's why we then do -- we print off all the detailed dispensing, all the transactions, and go through it manually after that and look at it specifically for other flags and other issues.
> **Q.** And if there are other issues and flags, nevertheless, there may be

> instances where there's no diversion going on whatsoever; correct?
> **A.** There are. This was very different and it was very clear that there was something going on.
> **Q.** And that is your opinion?
> **A.** Yes.

Id. at 92–93.

Defendant objected to the last two answers as improper expert-opinion testimony from a nonexpert witness. The district court overruled the objection, stating that although it was "a fairly close call," the testimony was "rationally related" to Dr. Cox's perceptions as Intermountain's Assistant Director of Pharmacy and therefore it was admissible lay opinion. *Id.* at 102–03.

Second, we note that Dr. Paulsen's trial testimony essentially reiterated the principal points of his testimony at the *Daubert* hearing. Perhaps of greatest significance, defense counsel made no effort at trial to question the reasonableness of Dr. Paulsen's using his published study (which analyzed the hydromorphone-to-hydrocodone ratio only for subjects with 2.0 ng or more of hydrocodone) to evaluate the test results on Defendant's hair samples where the concentrations of hydrocodone were 1.92 ng and 1.81 ng. Additionally, defense counsel did not question Dr. Paulsen about Psychemedics' testing-error rate or how that error rate might affect the calculation of Defendant's ratios.

Finally, we can briefly summarize the defense case. Defendant called three witnesses on his behalf, two nurses he had worked with at Intermountain and his wife (who was also a nurse at Intermountain). Defendant's coworkers testified that they never saw signs that Defendant was under the influence of opioids and that it was not

unusual for nurses to cancel transactions at the ADM or to carry around drugs. They also said that he was an excellent nurse.

Defendant's wife testified that at the time of the alleged diversion, Defendant was making mostly As and Bs as a student in a nurse-practitioner program. She also said that she had the training and experience to recognize signs of substance abuse and did not see any signs in Defendant. And she testified about various reasons why it might be necessary to cancel transactions and said that it was not abnormal for nurses to carry hydromorphone on their persons for an extended period of time before administering to a patient or wasting, sometimes because no other nurse was available to witness the wasting. Finally, she said that there was a hydromorphone shortage in late 2017 to early 2018, and that sometimes an ADM would run out of hydromorphone and it would take anywhere from 30 minutes to hours for the unit to be restocked.[7]

The jury found Defendant guilty on all counts. The district court sentenced him to 36 months' imprisonment on October 27, 2021. Defendant timely appealed his conviction.

[7]A pharmacy technician testified at trial that the hydromorphone shortage at that time was only for manufactured pre-packaged hydromorphone syringes. But this had little effect on Intermountain because the hospital pharmacy was able to compound its own pre-filled hydromorphone syringes by diluting vials of concentrated hydromorphone (which were readily available) with saline solution to reach the desired concentration.

II. DISCUSSION

Defendant's two principal arguments on appeal are that the district court erred (1) in allowing Dr. Paulsen to testify that the drug test on Defendant's hair indicated that he had most likely ingested hydromorphone, and (2) in allowing Dr. Cox, who was not qualified as an expert, to give opinion testimony regarding Defendant's diversion of the drug from its intended use for patients. He also raises a claim of ineffective assistance of counsel, but we dispose of it summarily in the following footnote.[8]

Both arguments require consideration of the treatment of opinion testimony in the Federal Rules of Evidence and governing precedent. Federal Rule of Evidence 701 governs the admissibility of lay opinion testimony. It provides:

> If a witness is not testifying as an expert, testimony in the form of an opinion is limited to one that is:
> (a) rationally based on the witness's perception;
> (b) helpful to clearly understanding the witness's testimony or to

[8] Defendant argues that he received ineffective assistance of counsel because his trial attorney's *Daubert* motion challenging Dr. Paulsen's testimony was filed late and he made no attempt to explain or show good cause for his tardiness. To establish ineffective assistance, Defendant must show that his attorney's performance was deficient and that he was prejudiced by that deficiency. *See Strickland v. Washington*, 466 U.S. 668, 687 (1984). In general, "[i]neffective assistance of counsel claims should be brought in collateral proceedings, not on direct appeal. Such claims brought on direct appeal are presumptively dismissible, and virtually all will be dismissed." *United States v. Galloway*, 56 F.3d 1239, 1240 (10th Cir. 1995) (en banc). But there is a narrow exception to this rule "where the record before us allows for a fair evaluation of the merits of the claim." *United States v. Crowe*, 735 F.3d 1229, 1244 (10th Cir. 2013) (internal quotation marks omitted). Here, because the district court resolved Defendant's untimely motion on the merits and because we affirm that ruling on the merits, Defendant cannot show prejudice from his trial counsel's tardy filing. The ineffectiveness claim therefore must be rejected.

> determining a fact in issue; and
> (c) not based on scientific, technical, or other specialized knowledge within the scope of Rule 702.

Rule 702 governs the admissibility of expert opinion testimony. It provides:

> A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:
> (a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;
> (b) the testimony is based on sufficient facts or data;
> (c) the testimony is the product of reliable principles and methods; and
> (d) the expert has reliably applied the principles and methods to the facts of the case.

Under these rules lay witnesses can offer opinion testimony rationally based on their perceptions, but not an opinion "based on scientific, technical, or other specialized knowledge within the scope of Rule 702." Fed. R. Evid. 701(c). Thus, a lay witness can offer "observations that are common enough and require a limited amount of expertise, if any." *James River Ins. Co. v. Rapid Funding, LLC*, 658 F.3d 1207, 1214 (10th Cir. 2011) (brackets, ellipsis, and internal quotation marks omitted). But if the testimony concerns "matters which are beyond the realm of common experience and which require the special skill and knowledge of an expert," then it is an expert opinion governed by Rule 702. *Id.* (internal quotation marks omitted).

Of particular relevance to this case is the requirement in Rule 702(c) that expert opinion "testimony [be] the product of reliable principles and methods." To assist the lower courts in assessing such reliability, the Supreme Court has pointed to several factors, while cautioning that the factors are neither exclusive (others may be

persuasive in some circumstances) nor dispositive (a principle may be reliable even if not supported by a particular factor): "(1) whether the theory can be tested; (2) whether it is subject to peer review and publication; (3) the known or potential error rate; (4) the existence and maintenance of standards; and (5) the general acceptance in the relevant scientific community." *United States v. Foust*, 989 F.3d 842, 845 (10th Cir. 2021) (citing *Daubert*, 509 U.S. at 593–94); *see Daubert*, 509 U.S. at 593 ("Many factors will bear on the inquiry, and we do not presume to set up a definitive checklist or test."). For example, one issue may be "[w]hether the expert has unjustifiably extrapolated from an accepted premise to an unfounded conclusion." Fed. R. Evid. 702 advisory committee's note to 2000 amendment (citing *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997)). "Fed.R.Evid. 702 imposes on a district court a gatekeeper obligation to ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable." *Dodge v. Cotter Corp.*, 328 F.3d 1212, 1221 (10th Cir. 2003) (internal quotation marks omitted).

Establishing reliability does not require showing that the expert's testimony is "undisputably correct" or without uncertainty. *Bitler v. A.O. Smith Corp.*, 400 F.3d 1227, 1233 (10th Cir. 2005) (internal quotation marks omitted). Instead, *Daubert* states that potentially uncertain (or "shaky") evidence is properly challenged at trial through cross-examination or with competing evidence. *Daubert*, 509 U.S. at 596. We apply these principles to the two witnesses whose opinion testimony is being challenged on appeal.

A. Expert testimony of Dr. Paulsen

1. Standard of Review

"We review de novo the question of whether the district court applied the proper legal test in admitting an expert's testimony. Though the district court has discretion in *how* it conducts the gatekeeper function, we have recognized that it has no discretion to avoid performing the gatekeeper function." *Dodge*, 328 F.3d at 1223 (citation omitted). "Therefore, we review de novo the question of whether the district court applied the proper standard and actually performed its gatekeeper role in the first instance. We then review the trial court's actual application of the standard in deciding whether to admit or exclude an expert's testimony for abuse of discretion." *Id.* "We give the district court substantial deference, reversing only when its ruling was arbitrary, capricious, whimsical, or manifestly unreasonable or when it made a clear error of judgment or exceeded the bounds of permissible choice in the circumstances." *Foust*, 989 F.3d at 845 (internal quotation marks omitted).

2. Admission of Dr. Paulsen's testimony

Although Defendant suggests that the district court failed to perform its gatekeeping role, his challenges to Dr. Paulsen's testimony concern only whether the court properly assessed the reliability of the underlying science. He advances no argument that the district court applied the incorrect legal standard, failed to adequately explain how it assessed the *Daubert* factors, or failed to meaningfully respond to Defendant's objections. There is no legitimate doubt that the district court performed its gatekeeping role.

As for the district court's application of the law governing expert testimony, on appeal Defendant does not challenge Dr. Paulsen's published study in any way, nor does he challenge Dr. Paulsen's credentials as an expert or the methodology of the testing of Defendant's hair samples. He does, however, raise two challenges to Dr. Paulsen's reliance on the study in testifying about Defendant's hair.

First, Defendant argues that the uncertainty of the measurements on his hair could mean that the ratio of the hydromorphone to the hydrocodone is too uncertain to be properly compared to the study results. At the *Daubert* hearing Dr. Paulsen, who had no notice to be prepared on this issue, stated that he did not know his laboratory's uncertainty-of-measurement calculation for the opioid levels measured for Defendant's hair samples. Defendant therefore posits that the ratio of hydromorphone to hydrocodone for those samples could be quite different from the ratio used by Dr. Paulsen in his testimony. (For example, if the actual concentration of hydromorphone was one-tenth the measured concentration and the actual concentration of hydrocodone was 10 times the measured concentration, the actual ratio would be 1% of the ratio used in the testimony.) But the fact that Dr. Paulsen did not know the precise uncertainty of measurement when he was testifying does not mean that the record lacks any indication of his laboratory's accuracy.

The published study states that the laboratory's accuracy was tested on samples of hydrocodone, hydromorphone, and four other opiates "at six concentrations ranging from 0.25 ng/10 mg to 150 ng/10 mg" and the laboratory measurements came within 20% of expected values. Aplt. App., Vol. I at 85. It is also

worth noting how similar the measurements were on the tests of the two hair samples taken from Defendant. Both tests measured the hydromorphone at 0.6 ng; the test results for oxycodone were 7.72 ng and 7.74 ng; and the measurements of hydrocodone differed by only about 6% (1.92 ng and 1.81 ng).[9] Even if the measured hydromorphone concentration in Defendant's hair samples was 20% too high and the hydrocodone concentration was 20% too low, the ratio would be no lower than 20.8%, which would be higher than more than 99% of the samples analyzed in the study. No wonder that Defendant did not raise this challenge to the laboratory's accuracy at trial.

Defendant's second argument is that Dr. Paulsen's testimony was unreliable because the study's analysis of hydromorphone-to-hydrocodone ratios only included samples containing 2.0 ng or more of hydrocodone, and his samples contained 1.92 ng and 1.81 ng of hydrocodone. Defendant did not make this argument in district court; and even though the district court sua sponte considered this issue in its *Daubert* ruling and said that it could be pursued by Defendant through cross-examination, etc. at trial, Defendant did not do so. Nevertheless, on appeal Defendant contends that the failure of his hair samples to reach the 2.0 nanograms threshold for

[9] Dr. Paulsen testified at the *Daubert* hearing and at trial that the differences between Defendant's two samples could be attributed to differences in blood flow to the individual hairs that made up the different samples. Dr. Paulsen also testified that to ensure no contamination and the accuracy of the testing, each sample was run as part of a batch that contained certified drug-free samples and drug-free samples fortified with the tested-for opioids at known concentrations. He stated that "[i]f any of those controls fail, the batch fails and the result would not be reported." Aplt. App., Vol. IV at 30.

the study renders Dr. Paulsen's testimony unreliable. *Cf. Underwood v. Bank of Am. Corp.*, 996 F.3d 1038, 1055 (10th Cir. 2021) ("Courts [of appeal] may review a question not pressed [in district court] so long as it has been passed upon [by the district court]." (internal quotation marks omitted)).

We are not persuaded. Although the concentration of hydrocodone in Defendant's samples did not meet the threshold for inclusion in the section of the published study analyzing hydromorphone-to-hydrocodone ratios, the levels were just below the threshold of 2.0 ng (they were tested at 1.81 and 1.92 ng), and Defendant has not suggested, much less shown, any scientific reason why the rate of metabolization of hydrocodone into hydromorphone would change significantly when the concentration of hydrocodone drops less than 10% below the threshold used in the study. As the district court stated:

> Th[e] study did exclude hydrocodone samples that were below 2 nanograms per 10 milligrams of hair, and [Defendant's] two samples had 1.92 and 1.81 nanograms of hydrocodone per 10 milligrams. I conclude, however, that the fact that the concentrations of hydrocodone in [Defendant's] hair samples were slightly below the minimum concentrations of samples included in the study does not make Dr. Paulsen's testimony unreliable. At most, this fact makes the testimony somewhat shaky.

Aplt. App., Vol. II at 19 (citation omitted). This court has recognized that expert testimony may be sufficiently reliable to be admissible despite the absence of proof that "the expert is undisputably correct." *Bitler*, 400 F.3d at 1233 (internal quotation marks omitted). In particular, as already noted above, "[v]igorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are

the traditional and appropriate means of attacking shaky but admissible evidence." *Daubert*, 509 U.S. at 596. And the Supreme Court has recognized that "[t]rained experts commonly extrapolate from existing data." *Joiner*, 522 U.S. at 146. Given that Defendant never challenged, either in the *Daubert* proceedings or at trial, the propriety of Dr. Paulsen's quite limited extrapolation from the results of the published study, we see no abuse of discretion in the district court's ruling that the extrapolation was sufficiently reliable to support the admissibility of Dr. Paulsen's opinion.

Defendant suggests that in light of the typical hydromorphone-to-hydrocodone ratio of less than 2%, a ratio cannot be calculated in samples with hydrocodone in the vicinity of 2.0 ng since the hydromorphone concentration would likely be well below the laboratory's detection limit of 0.5 ng. Dr. Paulsen made a similar observation at trial, stating that based on the typical ratios, he would not have expected to find a detectible concentration of hydromorphone in Defendant's samples. But the absence of examples of detectable hydromorphone when the hydrocodone was in the vicinity of 2.0 ng simply confirms Dr. Paulsen's conclusion that Defendant's ratio was abnormally high.[10]

[10] In the study almost 16,000 samples with 2.0 ng or more of hydrocodone were not included in the ratio analysis because there was not a detectable concentration of hydromorphone. The authors said that the absence of detectable amounts of hydromorphone in these samples "suggest[ed]" that "the levels of [hydromorphone] in hair from [hydrocodone metabolization] are small." Aplt. App., Vol. I at 90. We note that because the 16,000 removed samples contained at least 2.0 ng hydrocodone and under 0.5 ng hydromorphone, their ratios of hydromorphone to

The district court did not abuse its discretion in admitting Dr. Paulsen's testimony.

B. Testimony of Dr. Cox

Defendant objected at trial to Dr. Cox's opinion testimony that the situation with Defendant "was very different" and that "it was very clear that there was something going on." Aplt. App., Vol. II at 93. The district court overruled the objection on the ground that the testimony was lay-opinion testimony permitted by Rule 701. Defendant appeals, arguing that because Dr. Cox's testimony was based on his specialized knowledge, it was an expert opinion under Rule 702 and inadmissible because Dr. Cox was not qualified as an expert.

Difficult questions may arise in determining whether a witness needs to be qualified as an expert when testifying based on firsthand observations made during employment. One example is the testimony of police officers in law-enforcement investigations. In *United States v. Cristerna-Gonzalez* we said that "a law-enforcement officer's testimony based on knowledge derived from the investigation of the case at hand is typically regarded as lay testimony," but "opinion testimony premised on the officer's professional experience as a whole is expert testimony." 962 F.3d 1253, 1259 (10th Cir. 2020).

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hydrocodone could be no higher than 25%, which is below the ratios calculated for Defendant.

We need not resolve the issue in this case. Even if Dr. Cox's opinion was inadmissible because it was expert testimony, any error was harmless.

Because the error is not of constitutional magnitude, we may "reverse 'only if the error affects a substantial right of the party.'" *Burke v. Regalado*, 935 F.3d 960, 1011 (10th Cir. 2019) (quoting Fed. R. Evid. 103(a)); *see also United States v. Charley*, 189 F.3d 1251, 1270 (10th Cir. 1999) ("A non-constitutional error, such as a decision whether to admit or exclude evidence, is considered harmless unless a substantial right of a party is affected." (brackets and internal quotation marks omitted)). That is, we reverse only if the error "had a substantial influence on the outcome or leaves one in grave doubt as to whether it had such effect." *United States v. Rivera*, 900 F.2d 1462, 1469 (10th Cir. 1990) (en banc) (internal quotation marks omitted). In making this determination, we review the record as a whole. *See Burke*, 935 F.3d at 1011.

That review shows that Dr. Cox's statement added virtually nothing to the evidence otherwise before the jury. There was no objection to similar testimony from Dr. Cox that "[a]s someone who has to oversee concerns like this regularly," he was "very concerned" about what he found regarding Defendant. Aplt. App., Vol. II at 92. Perhaps most important was Dr. Cox's testimony that he had decided to "escalate[]" his concerns to Intermountain's diversion-detection task force, which unambiguously telegraphed how suspicious he was of Defendant. *Id.* at 70. After hearing Dr. Cox's testimony about what he did after reviewing Defendant's conduct, no juror needed to hear Dr. Cox's opinion testimony to know what he thought about Defendant's

handling of hydromorphone. Moreover, the challenged testimony was duplicative of Dr. Day's testimony. Like Dr. Cox, Dr. Day testified that he reviewed the reports of the ADS system and performed an independent investigation of Defendant's dispensing and administering behavior. And in testimony that has not been challenged at trial or on appeal, Dr. Day said that his "concern for diversion was pretty high." *Id.* at 143.

Because of how little effect the challenged testimony would have had, we have no concern that it influenced the outcome of this case.

III. CONCLUSION

We **AFFIRM** the conviction of Defendant Nathan Pehrson.

21-4133, United States v. Pehrson

HARTZ, J., concurring.

I write separately to suggest that this court should, as we do with all other evidentiary questions, review district-court rulings on expert opinion testimony under an abuse-of-discretion standard, abandoning our de novo review of "whether the district court applied the proper standard and actually performed its gatekeeper role." *Dodge v. Cotter Corp.*, 328 F.3d 1212, 1223 (10th Cir. 2003). Our de novo standard finds no support in decisions of the United States Supreme Court and is contrary to the weight of judicial authority and scholarship. And the de novo standard accomplishes nothing that cannot be accomplished under an abuse-of-discretion standard; that is, we would always reach the same result. All that we achieve by continuing with the de novo standard is that we confuse ourselves and litigants (as defense counsel was confused in this case) when we engage in the vain task of trying to draw the line between (1) reviewing whether the district court *actually* performed its gatekeeper role and (2) reviewing whether the district court *properly* performed that role.

To begin with, the Supreme Court has explicitly held "that abuse of discretion is the appropriate standard" to "apply in reviewing a trial court's decision to admit or exclude expert testimony under *Daubert*." *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 138–39 (1997). "That standard applies as much to the trial court's decisions about how to determine reliability as to its ultimate conclusion." *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 152 (1999). We have described the abuse-of-discretion standard as giving "the district court substantial deference, reversing only when its

ruling was arbitrary, capricious, whimsical or manifestly unreasonable or when it made a clear error of judgment or exceeded the bounds of permissible choice in the circumstances." *United States v. Foust*, 989 F.3d 842, 845 (10th Cir. 2021) (internal quotation marks omitted). But it also encompasses the traditional standards of review of questions of law and historical fact. As the Supreme Court has informed us, "A district court would necessarily abuse its discretion if it based its ruling on an erroneous view of the law or on a clearly erroneous assessment of the evidence." *Cooter & Gell v. Hartmarx Corp.*, 496 U.S. 384, 405 (1990); *see also Highmark Inc. v. Allcare Health Mgmt. Sys., Inc.*, 572 U.S. 559, 564 n.2 (2014) ("The abuse-of-discretion standard does not preclude an appellate court's correction of a district court's legal or factual error").

At most, two other circuits have published opinions that apply de novo review to whether the district court fulfilled its gatekeeper responsibility.[1] And the three minority circuits have not been applauded by scholars. As one commentator has observed: "[I]n some contexts or in certain courts, language of *de novo review* (or similar lack of deference) over certain aspects of the admissibility decision has,

[1] *See, e.g.*, *Smith v. Jenkins*, 732 F.3d 51, 64 (1st Cir. 2013) ("The question of whether the district court actually performed its gatekeeping function in the first place is subject to de novo review. If we are satisfied that the court did not altogether abdicate its role under *Daubert,* we review for abuse of discretion its decision to admit or exclude expert testimony." (internal citations omitted)); *Haley v. Kolbe & Kolbe Millwork Co.*, 863 F.3d 600, 611 (7th Cir. 2017) ("We review de novo whether a district judge has followed Rule 702 and *Daubert*. So long as the judge has applied the Rule 702/*Daubert* framework, we review the district court's decision to admit or exclude expert testimony for abuse of discretion." (internal citations omitted)).

despite the Supreme Court's broad statements of deference, crept back into application of this review." 1 Steven Alan Childress & Martha S. Davis, *Federal Standards of Review* § 4.02[4], at 4-33 (4th ed. 2010) (emphasis added) (citing opinions from First, Seventh, and Tenth Circuits). And another commentator has suggested that this special standard of review serves little purpose:

> Some appellate decisions indicate that they review de novo whether the district court applied the *Daubert* framework, reasoning that the trial court has discretion on how to conduct its gatekeeping function, but no discretion not to perform it at all, but in effect this is simply saying that it is an abuse of discretion not to apply *Daubert* at all.

Peter Nicolas, *De Novo Review in Deferential Robes?: A Deconstruction of the Standard of Review of Evidentiary Errors in the Federal System*, 54 Syracuse L. Rev. 531, 592 (2004) (footnote omitted) (citing opinions from Seventh and Tenth Circuits).

Moreover, as suggested by the second commentator, eliminating the de novo standard will not change any results. For example, a failure to perform the tasks required by Rule 702 would be an abuse of discretion because it would be an error of law (reviewed de novo under an abuse-of-discretion standard, as pointed out earlier). Or a failure to explain how the *Daubert* factors were assessed could be treated under abuse-of-discretion review as an error of law or simply a mine-run abuse of discretion. As far as I can tell, the only occasions on which published opinions by this court have held that the district court failed to perform its gatekeeper role have been where the court did not create "a sufficiently developed record in order to allow determination of whether the district court properly applied the relevant law." *Dodge*,

328 F.3d at 1223 (internal quotation marks omitted).[2] The same analysis and results could easily be reached by treating the failure to create an adequate record as an

[2] *See Adamscheck v. Am. Fam. Mut. Ins. Co.*, 818 F.3d 576, 586, 587–88 (10th Cir. 2016) (after stating that we review de novo whether court performed its gatekeeper role, we held that district court "failed to perform its gatekeeping function and, therefore, exceeded its discretion in excluding [expert's] testimony," because it did not provide "any meaningful analysis" in support of exclusion of testimony; "off-the cuff decision" was "based solely on an equivocal, one-sentence description of [the expert's] testimony provided by the party opposing its admission"); *United States v. Yeley-Davis*, 632 F.3d 673, 684–85 (10th Cir. 2011) (after stating that we review de novo whether court "actually performed its gatekeeper role," we concluded that district court abused its discretion by not performing its duties as gatekeeper because it "did not make any findings on the record to support its decision to admit the expert testimony"; but error was harmless); *United States v. Roach*, 582 F.3d 1192, 1207 (10th Cir. 2009) (on de novo review, we reversed admission of evidence because there were no "factual findings indicating the basis of the court's determination that [expert witness] met the requirements of Rule 702"); *Burlington N. & Santa Fe Ry. Co. v. Grant*, 505 F.3d 1013, 1031 (10th Cir. 2007) (after stating that we review de novo whether district court applied the legal test as gatekeeper properly, we reversed district court for "fail[ing] to make any findings on the record in support of its exclusion of [the] expert testimony"); *The Procter & Gamble Co. v. Haugen*, 427 F.3d 727, 742 (10th Cir. 2005) (after stating that "a district court has no discretion to avoid performing the gatekeeper function," we held that the court abused its discretion because it failed to give notice that it was considering the admissibility of the expert's testimony and failed to accept detailed briefing from the parties, leading to a ruling with "no detailed or specific findings by the district court on the record regarding why it concluded the testimony was inadmissible." (internal quotation marks omitted)); *Dodge*, 328 F.3d at 1223, 1225–28 (after stating that "[w]e review de novo the question of whether the district court applied the proper legal test in admitting an expert's testimony," we concluded that "the district court did not perform its gatekeeper function . . . and thereby abused its discretion by admitting [expert] testimony" without making adequate findings on the record to show that the testimony was both relevant and reliable and based on valid reasoning and reliable methodology); *Goebel v. Denver & Rio Grande W. R.R. Co.*, 215 F.3d 1083, 1087–88 (10th Cir. 2000) (after stating that "[w]e review de novo the question of whether the district court applied the proper legal test in admitting [the expert's] testimony," we held that district court "abused its discretion" in admitting expert testimony when there was "not a single explicit statement on the record to indicate that the district court ever conducted any form of *Daubert* analysis whatsoever"); *United States v. Velarde*, 214 F.3d 1204, 1211 (10th Cir. 2000) (district court abused its discretion in admitting expert testimony without a reliability determination); *United States v. Charley*, 189 F.3d 1251, 1261, 1267–68 (10th

abuse of discretion. Indeed, it is both ironic and striking that, as revealed by the parentheticals to this court's opinions cited in footnote 2, most of our decisions reversing a district court's ruling on the admissibility of expert testimony because of that court's failure to exercise its gatekeeper function first quote our de novo standard of review and then proceed to conclude that the court abused its discretion by admitting or excluding the testimony.

The great advantage of eliminating our separate de novo standard of review is that it would bring clarity and simplicity to the law. For example, in a yeoman effort to reconcile our use of conflicting standards of review, one panel declared:

> When a district court neglects its gatekeeping function, it commits two errors. First, it commits error, reviewable de novo, by not making a reliability determination. Second, it abuses its discretion when it *admits* the expert testimony without a reliability determination. These errors are really two sides of the same coin, and our conclusion that the district courts in *Velarde*, *Goebel*, and *Dodge* abused their discretion is consistent with the application of de novo review to such cases.

United States v. Avitia-Guillen, 680 F.3d 1253, 1258 n.3 (10th Cir. 2012). No mental gymnastics would be necessary to reconcile different standards of review if we simply applied abuse-of-discretion review in all circumstances. Discarding our de novo review standard would also eliminate the cognitive distress created by the need to determine which standard of review should be applied when resolving a particular challenge to a district court's ruling on the admissibility of expert testimony.

Cir. 1999) (we applied only an abuse-of-discretion standard and held that the district court erred in allowing expert testimony without making a reliability determination). In all these cases the district court provided no findings under Rule 702 that we could review.

Unfortunately, too often the most difficult task for the appellate court is determining what it means to *perform the gatekeeper role*. In this case, for example, Defendant's opening brief complains:

> Here, the district court did not properly exercise its gatekeeper function when it permitted Dr. Paulsen to testify about ratios of hydromorphone (Dilaudid) to hydrocodone in Mr. Pehrson's sample and opine that he had most likely ingested Dilaudid based on his ratios because the Government failed to demonstrate that this testimony had a sufficiently reliable foundation as applied to the facts of this case.

Aplt. Br. at 37. The brief apparently interprets performance of the gatekeeper role to mean "deciding whether expert testimony is admissible." Defendant's position amounts to saying that we must review de novo each aspect of the district court's evidentiary ruling. Of course, every appellant has an incentive to press for the less deferential de novo standard of review, so perhaps counsel's expansive reading of the scope of that review can be attributed to the enthusiasm of an advocate. But as a matter of reading the English language, the defense position is hardly unreasonable. How much better it would be if we could eliminate the scholastic exercise of distinguishing between the issues of whether the gatekeeper role was *actually* performed (which is reviewed de novo) and whether it was performed *properly* (which is reviewed for abuse of discretion).[3]

[3] To be sure, this court could greatly reduce any confusion by providing a clear, precise description of what it means to say that the district court "actually performed its gatekeeper role." *Dodge*, 328 F.3d at 1223. But we have yet to do so for more than 20 years. And in any event, simply applying an abuse-of-discretion standard would eliminate the need for such a description.

It seems to me that our gatekeeper-role de novo standard of review has outlived its usefulness. That standard could readily be folded into an overall abuse-of-discretion standard without violating any precedential holdings of this court.