Technology
Today

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The RaDonda Vaught Case: A Critical Conversation on Nursing Practice and Technology

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On March 25, 2022, a jury found nurse RaDonda Vaught guilty of criminally negligent homicide and felony abuse of an impaired adult. The case involved a fatal medication error that occurred on December 26, 2017, while Vaught worked as a registered nurse at Vanderbilt University Medical Center.[1] Following the conviction, there was an avalanche of reactions from both within and outside of the nursing profession.

A statement by the American Association of Critical-Care Nurses (AACN) described the conviction as a dangerous precedent that ignores decades of safety research.[2] The American Nurses' Association released a statement that noted, "We are deeply distressed by this verdict and the harmful ramifications of criminalizing the honest reporting of mistakes."[3] The American Organization for Nursing Leadership asserted criminal prosecutions for unintentional acts are the wrong approach, adding nurses should be encouraged to report errors so that prevention strategies can be identified and employed.[4] The American Nursing Informatics Association (ANIA) highlighted the significance of workflow design, communication, testing, and validation of information systems in supporting patient safety.[5] The American Society for Health Risk Management,[6] National Medical Association,[7] Dana-Farber Cancer Institute,[8] and others made similar statements.

Tens of millions of social media posts, comments, shares, and videos were less in agreement than the above organizations. They ranged from "this could happen to any of us" to observations that the outcome was just or unjust. Videos on TikTok with the hashtag #radondavaught totaled more than 76 million.[9] Some warned that the fallout will include demoralization in the nursing profession and nurses leaving their jobs.[10] Nurses did leave their jobs. One nurse stated, "It's not worth the possibility or likelihood that this will happen if I'm in a situation where I am set up to fail."[10]

These responses warrant a critical conversation. However, my current discussion is not about the guilt, innocence, or conviction of RaDonda Vaught. Instead, I'm focusing on something missing in the public statements, articles, and social media as well as the reports by the Centers for Medicare and Medicaid Services (CMS)[11] and the Tennessee Bureau of Investigation (TBI)[12]: the role technology played. The use of technology is important and applicable to nursing practice generally, and understanding its interplay in mistakes like

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RaDonda Vaught's helps us arrive at solutions. Without understanding how nursing practice and technology are intertwined, we focus on blaming nurses, when the problem and the solutions exist elsewhere.

Background

In *Hospital Topics,* Maher and Cwiek[13] discussed the Vaught case along with others involving criminal liability for medical harm. The word *technology* doesn't appear until the last sentence in the article, as a suggestion for "improved technology fail-safe mechanisms."[13] Does this suggestion imply technology could be a contributor to medical errors?

Presumably because the case involved a medication error, the authors highlighted the 5 Rs of medication administration[13]: right patient, right drug, right dose, right time, and right route.[13] In recent years, 3 more Rs have been added to this list: right documentation, right reason, and right response.[13] The authors concluded that if nurses follow these fundamentals, "this sort of tragic issue should not occur."[13] Leading patient safety organizations disagree.

In 2007, the Institute for Safe Medication Practices (ISMP) reiterated their position on the 5 rights of medication administration from their 1999 statement: "To be clear, nurses and other practitioners cannot be held accountable for achieving the five rights; they can only be held accountable for following the processes that their organizations have designed and held out as the best way to verify the five rights."[14] ISMP went on to say, "Adding a sixth, seventh, or eighth right (e.g., right reason, right drug information, right line attachment) is not the answer, either."[14] Similarly in 2005, the Pennsylvania Patient Safety Authority (PSA) released a Patient Safety Advisory, produced for them by Emergency Care Research Institute (ECRI) and ISMP, stating that beginning in nursing school every nurse is taught the 5 rights of medication administration, "Yet many errors, including lethal ones, have occurred in situations in which nurses firmly believed they had verified each of the Five Rights."[15] In all, it came down to the 5 rights being "broadly stated goals" or outcomes and not procedural rules or processes.[14]

These top safety organizations, ISMP, ECRI, and PSA, agreed that the duty of nurses was not so much to achieve the goals outlined by the 5 rights but to follow the procedural rules designed by their employers to produce these outcomes.[14] If procedural rules cannot be followed due to system issues, nurses have an additional duty to report these issues so they can be resolved.[14] ISMP added:

> If we hold individuals accountable for achieving the five rights, we really should give them the authority to design their own systems for achieving these outcomes. After all, how can we hold individuals accountable for things that are not under their control? However, since organizations typically decide the processes that are necessary for achieving the five rights, individuals who follow these processes should not be held individually accountable for an undesirable outcome. **Improvements must be made in the systems designed to achieve the five rights, not in the individual's practice or behavior.** [bold added] The five rights are not a behavioral model for achieving medication safety, but goals for which organizations must accept responsibility and design failsafe ways that they can be achieved.[14]

Maher and Cwiek[13] noted, "What one perceives to be the proper consequences for the actions of a Nurse Vaught may well be contingent upon what one chooses to focus on."[13] Yes, thus I hope some focus on technology in medication errors can lead to solutions.

Nursing Practice and Technology

Nursing is a science built on multiple sciences. If we look at patients through the lens of chemistry, we see elements and compounds. An example is laboratory results. If we look at patients through the lens of biology, we see anatomy and physiology. An example is body structures and how they work. If we look at patients through the lens of psychology, we see the human mind and how it functions. An example is behaviors. If we look at patients through the lens of physics, what do we see? An example would be blood pressure. If we look at patients through the lens of pharmacology, we see medications and the actions they have on patients. Nursing practice requires nurses to use multiple lenses to care for the whole patient.

Technology adds a complex lens to an already complex picture, encompassing all the sciences mentioned above and more. So, what do we see when we look at patients through the lens of technology? What we see depends on how the technology is designed. How things are designed shapes our lives, professional as well as personal.

An example is the chairs we sit in. How they are designed determines the goals achieved, such as comfort, fit in available space, or aesthetics. There are also some basic design principles that should always be met. For example, designing a chair with 4 legs of various lengths is unlikely to achieve many goals.

In a similar way, design of technology matters in achieving the desired goals for nursing practice. T*echnology is not neutral* in the context of health care, a fact clearly illustrated more than once in the Vaught case.

Impact of Words in Technology

The words that nurses see when using technology are consequential. The physician in the Vaught case ordered Versed (midazolam), the pharmacist verified the order for Versed, Vaught understood and intended to administer Versed.[11] We know the last because Vaught searched the automated dispensing cabinet (ADC) for Versed and later testified to such in both CMS and TBI investigations.[11,12] When she went to the ADC to pull the medication, she couldn't find Versed in the patient's profile.[11,12] According to the CMS investigation, Vaught "checked the medication administration record (MAR) in a computer in a patient's room and found the order was there for Versed."[11(p5)] She then returned to the ADC and overrode the system in an attempt to pull Versed.[11,12] That action ultimately led to the selection of the wrong medication.

Vaught or any nurse would not see the word *Versed* on the initial ADC interface because the ADC at the hospital was programmed at that time to default to generic medication names.[11] Nurses had to select the "Brand Name" button on the ADC to display brand names.[11] The technology and process as designed required a decision-making process from Vaught and other nurses that might involve the following steps: (1) to have been informed of the ADC default to generic medication names,[11] (2) to recall the ADC default display of generic medication names, (3) to recognize Versed as a brand name, (4) to have been informed of the button on the ADC interface that switches medication names from the default generic medication names to brand medication names, and (5) to recall how to make that switch from the default generic medication names to brand medication names. Or faced with the same ADC design, the decision-making process for

nurses could also require (1) having been informed of the ADC default to generic medication names,[11] (2) remembering this ADC default to generic medication names, (3) recognizing Versed as a brand name, (4) recalling the generic name for Versed or where to look it up, (5) knowing how to correctly spell the generic name, and (6) recalling how to input the correctly spelled generic name into the ADC interface.

Would it not be safer, more reliable, and easier to use if there was consistent terminology in all technologies within an institution? In Vaught's case, inconsistency in drug names created an unnecessary complexity to information processing during the medication administration process. This appears to be where Vaught and technology veered off course in medication administration.

Technology Design

Design strategy focuses on technology ecosystems consisting of a collection of technology solutions within a health care organization. For example, nurse-facing technologies should use the same terms—in this case, "Versed"—as those used by physicians and pharmacists. This is important because design flaws in health information technology (HIT) not only lead to increased cognitive work for end users and negative impact on workflows but also can result in patient harm as we see in Vaught's case.[16]

Consistency is a fundamental design principle in individual technology as well as across networked systems.[17] It is extensively used in good design for everything from navigation to screen formats, fonts, color, drug names, and much more. Consistency in technology design sets clinicians' expectations for continuity, making technologies easier to learn, easier to use, and safer. Failure to address design deficiencies, such as inconsistency in terms used across networked HIT, can result in unintended consequences. Lack of consistency in health care technology is a widespread, serious, and unresolved problem.[18] Information on best practice is decades old, suggesting we should ponder why it is not being used.

In addition, should the term *Versed* be used at all, since the brand name was discontinued in 2003?[19] The name no longer appears in RxNorm, a compilation of names for all medications used in the United States, maintained by the National Library of Medicine.[20] I encourage you to search the associated database,

RxNav, for the terms *Versed* and *midazolam*.[21] If a drug name no longer appears in authoritative sources, why is it still being used in health care technology?

Distributed Cognition

I noted earlier that nursing is a science built on multiple sciences. One scientific theory, *distributed cognition*, is an important addition to nursing science in the age of technology. Distributed cognition focuses on how cognitive activity occurs not just in the mind of an individual but is distributed across multiple human minds, external cognitive artifacts, and groups of people across space and time.[22] External cognitive artifacts include objects such as buttons on an ADC user interface, symbols such as vital signs in an electronic health record, and tools such as a medication dosing calculator that support or modify human cognitive behavior.[22] In other words, distributed cognition is a theory of human cognition describing information processing dispersed across people, workplaces, and technologies, and how information processing evolves over time.[23] Distributed cognition offers a beneficial approach for illuminating the kinds of challenges clinicians encounter when using technology as well as understanding ways to improve it.[24] The theory may also offer a window into why HIT sometimes fails to prevent errors or can contribute to errors.[24]

A good example of distributed cognition involves the role nurses play in patient diagnosis while working in the emergency department (ED). There are approximately 141 million patients annually in EDs across the United States in need of an appropriate diagnosis.[25] Decision-making in this time- and information-constrained environment puts nurses and physicians at especially high risk of making diagnostic errors.[25] The process of diagnosing patients involves the collective exchange of information within the defined structure of the ED using available resources.[25] The diagnosis is not the result of one individual's mind but is made through the interactions and unique contributions of multiple clinicians and the artifacts they use.[23]

Distributed cognition is important to recognize in the Vaught case because design errors, such as inconsistent naming of medications in nurse-facing technologies including the MAR and the ADC, are major causes

of error in the United States.[25] In health care, the domain of a "system" of importance, such as medication administration, often involves not 1 clinician or 1 computer device or software application but multiple individuals and multiple devices or applications; as such, these systems must be designed with the whole in mind.[25] As Masci et al[25(p113)] noted, "This is especially relevant in safety-critical domains, such as health care."

Just as nurses sometimes think our knowledge holds the answers for patient situations before us, HIT designers can be likewise technocentric, designing an electronic health record, ADC, infusion pump, or other hardware or software with a focus on what an individual technology holds and ignoring other contributing people or systems and identified goals.[26] The designers examine technology and use requirements but don't fully consider the larger system, which includes people such as the patient, nurse, physician, pharmacist, and other clinicians, as well as other technologies.[26] As nurses leverage technology in their work, we must address the interplay of diverse resources encompassing a larger cognitive system.[27]

Conclusion

The Institute for Healthcare Improvement (IHI) and the IHI's Lucian Leape Institute released a joint statement following the conviction of RaDonda Vaught about the risks to patient safety when medical errors are criminalized.[28] They reminded us that most medical errors result from faulty systems and not irresponsible clinicians.[28] They went on to say that "criminal prosecution over-focuses on the individual and their behavior and diverts needed attention from system-level problems and their solutions."[28] Criminalizing medical errors negatively impacts the work environment and organizational culture, resulting in fear and blame, which are counterproductive to patient safety.[28]

There is no going back to a time with less technology in nursing; technology will increasingly be intertwined with nursing practice. RaDonda Vaught's case requires the profession to consider: are nurses and patients bearing the cost of poorly designed technology in patient care? This question will continue to be examined by the nursing profession—leaders, academicians, informaticists, licensing boards, professional associations, and more—in

collaboration with HIT professionals and vendors. Technology is intended to be beneficial to your nursing practice. It should be designed so that it not only supports your practice but also makes it safer.

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