

Cognitive Overload, Medical Errors, and a 5-Point Communication Strategy to Help Clinicians Stay Focused

CNO Perspective

Cognitive Overload and Medical Errors

Nurses make mistakes every day due to cognitive overload. I'm certain most of us can think back to a time when we've made an error, and I'm sure that if we had an opportunity to do it over, we would. After all, we entered nursing and invested years on our education in order to make people better, not to hurt people. Many of us carry the consequences of errors, large or small, forever.

Cognitive load can be defined as the amount of information a person holds and processes within working memory; working memory can be thought of as "the ability to remember and use relevant information while in the middle of an activity."ⁱ

Cognitive load often becomes overload for nurses and physicians because they can rarely control the amount of information that comes to them, or the manner or speed with which it's delivered. Hundreds and perhaps thousands of times each day, they are required to process information to determine if it is useful, urgent, or of consequence.

Widespread Problem Impacting Patient Safety

Between 250,000 and 440,000 people die each year from medical errors in the U.S., where medical errors are the third leading cause of death.ⁱⁱⁱ Distraction has been shown to play a role in nearly 75 percent of medical errors, and studies have demonstrated that cognitive overload is a cause in 80 percent of medical device user errors.^{iv v}

A survey Vocera® conducted at HIMSS19 with HIMSS Analytics, part of Definitive Healthcare, points to the prevalence of cognitive overload.^{vi} A vast majority of clinical and IT leaders have recognized signs including clinicians appearing

stressed or overwhelmed. More than half of survey respondents said clinicians ignore or fail to notice actionable alerts, which are alerts related to a patient's condition or care.

The need for hospitals to manage and minimize clinician cognitive load is imperative. We need to understand how it happens, and work to solve for its causes.

How Cognitive Overload Can Lead to Medical Errors

Humans parse and make sense of what is going on around them through the act of segmenting. As a clinician in a hospital environment, you constantly segment what is important and urgent as you perform ongoing triage among shifting priorities. When you receive too many pieces of information at once, you become overloaded, and it becomes difficult to segment and to focus on critical patient care tasks. This is where mistakes can happen.

Understanding Cognitive Load in the Context of the Clinical Environment

One of our core cognitive skills is the ability to categorize information and put it in the proper place. We do this in short-term memory, which has a life span of about 15 seconds to a minute, depending on the content.^{vii} It's estimated that the attention span of most adults ranges from five to 20 minutes and some say it's as short as eight seconds.^{viii ix}

Recognizing the limitations of memory and attention is the basis from which I talk about cognitive load and overload in clinicians.



Rhonda Collins, DNP, RN
Chief Nursing Officer

Three Types of Cognitive Load

The cognitive processing of a constant influx of information, such as what a clinician may encounter while caring for four to six patients simultaneously, is an ongoing act of sensemaking and of learning. Learning theory identifies three types of cognitive load: intrinsic, extrinsic, and germane.¹

Intrinsic Cognitive Load – What You Bring

Intrinsic cognitive load refers to the level of cognitive effort you need to expend to complete a problem or task.¹ As a clinician, your intrinsic load is affected by things that take up space in and diminish your short-term memory. These things could be stress factors like lack of sleep, a sick child at home, or forgetting a dentist appointment. Intrinsic load can be compounded by larger, deeper emotions such as guilt, grief, and empathy, especially when stress factors reduce your ability to compartmentalize these emotions.

Extrinsic Cognitive Load – What the Environment Delivers

Extrinsic load describes the level of cognitive effort demanded of you by the working environment.¹ You have little control over the extrinsic cognitive load placed upon you. If you get to work and you're bombarded with information and you can't control how it's coming at you, you have a heavy extrinsic load.

Germane Cognitive Load – How You Make Sense of It All

Germane cognitive load is the effort you expend to make sense of new information.¹ If you receive a lab value with no context and must go to another system and retrieve past values and other related information to understand the complete picture, you have a heavy germane cognitive load.

How Hospitals Can Solve These Challenges: a 5-Point Communication Strategy

A hospital that's standardized on a single clinical communication and collaboration (CC&C) platform for all clinicians is positioned to employ strategies to address cognitive overload. Hospitals need to simplify workflows and offload clinicians' need to retrieve, retain, and

record information, making it easier to communicate and do their job. A comprehensive CC&C platform can make all the difference.

With a comprehensive CC&C platform in place, you can take measures to reduce cognitive load, which include:

1. Contextualizing information.
2. Deflecting distractions to focus on critical tasks.
3. Providing a single source of information and standard protocols.
4. Offloading the need to retrieve, retain, and record information.
5. Weeding out extraneous information.

1. Contextualize Information

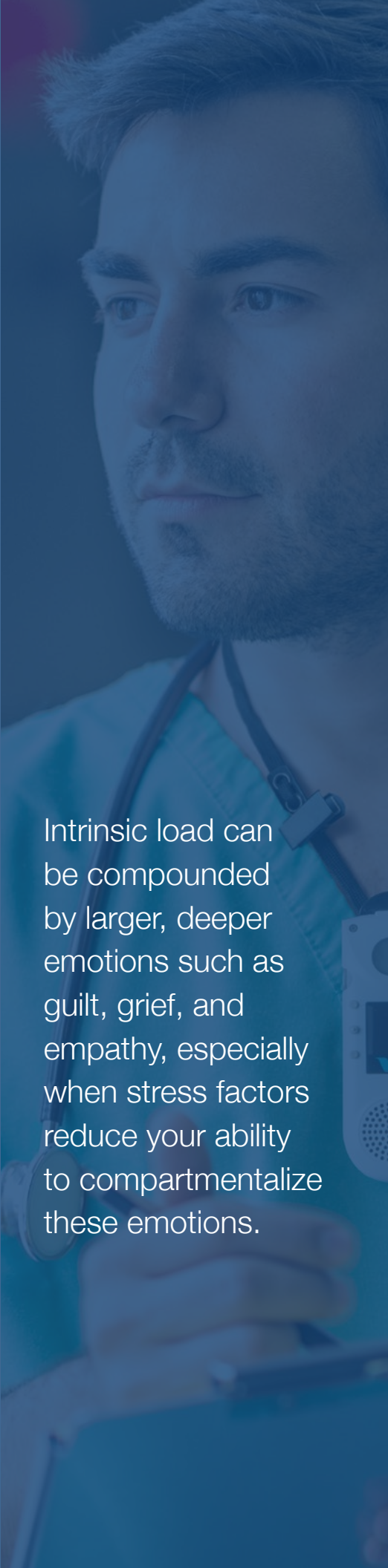
With autonomous problem solving, you try to solve a complex problem without having full context. In the clinical environment this might mean you have a small piece of standalone information, such as a lab value, for one patient. At the same time, you have similar pieces of standalone information for two or three other patients.

As one individual person in your busy world, you try to use these small pieces of information to solve complex problems. You go into a form of cognitive overload because you have multiple pieces of information, but you can't slot them into any file system in your head that makes sense to you.

A strategy for countering autonomous problem solving in the clinical setting is to provide patient identifiers with notifications, along with an information chain of relevant context.

Let's say you just received a lab value on Mr. Jones. That lab value is standalone information. If you must go into some other system to see what his prior lab value was, it adds to cognitive burden. But if you have a CC&C solution that provides the previous lab value so you can compare the current value to it, you have a more complete picture of Mr. Jones' status. The lab value becomes part of a complete picture rather than being isolated information you must struggle to reconcile.

Vocera technology helps relieve the burden of segmenting information by attaching patient information to the patient's record so it's easy to access. Our technology can also contextualize information around a patient or situation. We can attach vital signs, lab values, nurse-call information, and other data such as sepsis risk indicators to the profile of a patient who is the focus of a notification or request.



Intrinsic load can be compounded by larger, deeper emotions such as guilt, grief, and empathy, especially when stress factors reduce your ability to compartmentalize these emotions.

More than half the respondents in our survey of clinical and IT leaders at HIMSS19 think that trying to communicate via technology is a source of cognitive burden for clinicians. The likely reason is that many tools used for communication such as pagers, standalone texting platforms, and some mobile apps are not integrated into a consolidated software workflow.

“ We have eliminated so much of the wear and tear, physically and emotionally, on our care teams. No longer is the focus on running around, trying to find the right person. With Vocera, the care team is taken care of and they can focus on what they signed up to do – provide the best patient care.”

Linda Wessic, COO, CNO and Vice President at [Major Health Partners](#)

2. Deflect Distractions to Allow Focus on Critical Tasks

As a clinician, it is common for your attention to be split among multiple information sources as you try to process many details at the same time. This can lead to cognitive overload and leave you unable to focus on a critical task.

With Vocera technology you can put your mobile device on Do Not Disturb mode and divert extraneous information into voicemail. You can listen to your messages when your brain has working capacity available to segment the information they contain. When a matter is truly urgent, a caller can break through Do Not Disturb.

A user can also set options to forward incoming calls to another number. Calling workflows can be set to forward incoming calls to other people in a group and then automatically escalate to other groups if no one in the first group is available.

3. Provide a Single Source of Information and Standard Communication Protocols

More than half the respondents in our survey of clinical and IT leaders at HIMSS19 think that trying to communicate via technology is a source of cognitive burden for clinicians. The likely reason is that in many hospitals, tools used for communication such as pagers, standalone texting platforms, and some mobile apps are not integrated into a consolidated software workflow.

As an example, a nurse needs to call a physician about a patient having pain issues. With unintegrated or disparate communication tools, the nurse might have to call the physician's answering service, page overhead, or use some other individualized way to communicate based on whatever is available.

With Vocera technology, a nurse doesn't have to use short-term memory to sort out what system to use to contact the doctor. Our technology allows a hospital to create a standard protocol and consolidated software workflow for communication where all clinicians and ancillary staff can work with the same software, using the same nomenclature.

It doesn't matter what communication device you're using. Whether you're using the Vocera Smartbadge or Badge, a smartphone, or a web console, the software causes you to conduct your conversation in a set, standardized way where everybody becomes accustomed to the protocol. If a nurse

and a physician are both on the Vocera Platform, one would expect a message from the other to come through the Vocera software regardless of the end device either is using, via voice or text. Populated fields would provide patient information as context.

When the communication protocol is standardized this way, clinicians don't need to use short-term memory to piece together the patient status.

4. Offload the Need to Retrieve, Retain, and Record Information

Respondents to our survey with HIMSS Analytics of clinical and IT leaders at HIMSS19 overwhelmingly identified documenting and charting in the EHR as a source of cognitive overload. A healthy majority also said that proactively pushing relevant EHR data to the right nurse at the right time on his or her mobile device would help with managing large amounts of urgent information.

Redundancy of documentation is a huge problem in medical care. When you must write the same information three or four times in three or four different places while you're busy and juggling information about four to six different patients, you're likely to make a mistake.

Vocera technology lets you offload the need to retrieve, retain, and record certain types of information so you don't need to carry it in short-term memory. Our platform provides a single source of aggregated information that is accessible to the entire care team and doesn't need to be replicated again and again.

5. Weed out Extraneous Information

Weeding refers to removing extraneous information from the conversation. With weeding, what is removed is just as important as what is allowed through.

Perhaps a nurse doesn't need to receive a patient's vital signs every 15-30 minutes if a patient is stable or be notified when a patient's SpO2 has dropped down to 88% if the patient normally sats at 88%.

When it comes to management of secondary alert and alarm notifications, Vocera technology accomplishes extraordinary weeding by allowing nuisance notifications to be filtered out. Clinicians receive only the information on which they need to act. We work with hospital clinical and IT leaders to identify which alert and alarm notifications need to be managed, and to set intelligent rules to do it.

A CC&C Platform and a Record Repository Are Not the Same Thing

As we work to reduce nurses' cognitive load, we must remember, always, that communication is an urgent act and short-term memory has limits. When a nurse needs help immediately or needs to remember information in a critical moment, technology can support the context of workflow.

We should provide nurses with the right tool for the task. I caution any nurse leader who would consider directing nurses to communicate and collaborate using a tool designed for storing medical records.

Recently I was speaking with a nurse executive and chief medical officer at a hospital. The chief medical officer expressed it perfectly when she said, "The EHR is for documentation, not for urgent communication. I've missed urgent communication because I didn't have anything telling me it was urgent. The communication would just mix in with all the other information in the EHR that I had to be aware of and get to when I could."

So often the technology we are trying to manage, such as the EHR or a patient monitor, is providing information that is retrospective or is dependent on context. We must carry a cognitive load to remember to go into the EHR to enter or obtain information, to remember to write down the information, to recall the context of which patient it pertains to, and to recognize what is most important moment-to-moment in an environment where conditions are constantly changing.

This burden of remembering contributes to mistakes. Nurses need communication and collaboration tools that assume that burden.

Summary: Creating a Safer, More Effective Work Environment

All nurses experience cognitive load that can lead to overload every single day. When we make ourselves aware of it, we see it everywhere.

As a nurse leader, you have a responsibility to recognize cognitive overload in your clinicians and take active measures to reduce its consequences. By doing so, you can help create a safer, more effective work environment and avoid the consequence of losing exceptional nurses due to the stress caused by the chronic difficulty of managing information, triaging priorities, and communicating.

Nurses cannot control the amount of information coming at them, nor how it is delivered. If you apply the right tools to help structure information, to offload the need to retain and replicate information, and to weed out nuisance interruptions, you will help reduce the cognitive burden for nurses.

Reducing the cognitive burden helps create a more satisfying work environment and fosters well-being and retention. It allows nurses to function in a more aware and present domain so they can provide a better experience and outcomes for patients.

We need to provide nurses with the right tool for the task. I caution any nurse leader who would consider directing nurses to communicate and collaborate using a tool designed for storing medical records.

“The ultimate vision of the clinical leadership team was to reduce interruption fatigue among our staff by ensuring that nurses would not receive secondary notification of a patient monitor alarm if they were within proximity of that same patient monitor.”

**Monique Lowery, BSN, RNC-NIC,
Clinical Manager at
[Sentara Princess Anne Hospital](#)**

Author Highlights

In 2019 Rhonda Collins was honored as one of the 100 most influential women in Silicon Valley, receiving a 2019 Women of Influence Award from the Silicon Valley Business Journal. In 2017 and 2018 Becker's Hospital Review included her on its "Women in MedTech to Know" and "Female Healthcare IT Leaders to Know" lists.

Rhonda Collins, DNP, RN, has served as chief nursing officer at Vocera since January 2014. As CNO, she is responsible for working with nursing leadership groups globally to share clinical best practices, help them better understand the value of Vocera solutions, and bring their specific requirements to our product and solutions teams.

Prior to joining Vocera, Rhonda was vice president and business manager for Fresenius Kabi, USA, responsible for the launch of the company's intravenous infusion pump in the United States. She also led the American Nurse Project, elevating the voice of nurses across the country.

Through her previous experience at Masimo Corporation as vice president of nursing and at Baylor University Medical Center as vice president of women and children's services, she gained deep experience maximizing market share and profitability while building on best clinical and business practices.

Rhonda holds a Doctor of Nursing Practice from Texas Tech University Health Sciences Center and a Master of Science in Nursing Administration from the University of Texas. In 2017 and 2018 Becker's Hospital Review included her on its "Women in MedTech to Know" and "Female Healthcare IT Leaders to Know" lists. In 2019 she was honored as one of the 100 most influential women in Silicon Valley, receiving a 2019 Women of Influence Award from the Silicon Valley Business Journal.

About Vocera

The mission of Vocera is to simplify and improve the lives of healthcare professionals and patients, while enabling hospitals to enhance quality of care and operational efficiency.

In 2000, when the company was founded, we began to forever change the way care teams communicate. Today, more than 1,850 facilities worldwide, including nearly 1,600 hospitals and healthcare facilities, have selected our clinical communication and workflow solutions. Care team members use our solutions to communicate and collaborate with co-workers by securely texting or calling, and to be notified of important alerts and alarms. They can choose the right device for their role or task, including smartphones or our hands-free, wearable Vocera Smartbadge and Vocera Badge.

Interoperability between the Vocera Platform and more than 140 clinical and operational systems helps reduce alarm fatigue; speed up staff response times; and improve patient care, safety, and experience.

Vocera (NYSE: VCRA) is publicly traded with the resources and fortitude to help ensure your success with our solutions over the long term. In 2017, Vocera made the list of Forbes 100 Most Trustworthy Companies in America.

Learn more at www.vocera.com, and follow @VoceraComm on Twitter.

End Notes

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