Critical communication lessons from a fire

What healthcare can learn from the destruction of the Notre Dame cathedral

By Benjamin Kanter, MD

Just over a year ago, on April 15th, 2019, one of the world's architectural and spiritual treasures was nearly destroyed when fire razed the Notre Dame Cathedral, in Paris. The fire devastated an iconic monument that had stood for more than 800 years, leaving a burnt-out husk. How could such a thing happen? Are there lessons that we in healthcare can learn from such an event?

As it turned out, the potential for fire in the cathedral was anticipated, almost expected, given that much of the structure beneath the heavy, lead-shingled roof was a nest of ancient oak beams affectionately called "The Forest".

To head off such an event, tremendous efforts were expended to craft a highly customized detection and response system – in a hospital what we'd call an "early warning system" – a system used to trigger a rapid response or medical emergency team. And yet, the cathedral was all but destroyed. What went wrong?

The cathedral did have an alarm system, yet a root cause analysis of the fire reveled several gaps in communication.

The communication and collaboration system is a fundamental component of a smart or real-time health system.

Alarms did not go to the right people. Messages were unclear, and there were no systems of backup or escalation. For healthcare leaders who want to avoid disaster of their own, there are lessons to be learned by the fire at Notre Dame Cathedral.

Root cause analysis

It is useful to examine what happened when the blaze started at Notre Dame, and how it was handled. We will then look at how the situation could have been more effectively controlled.

Here, in brief were the sequence of events that took place that day in Paris.

• The cathedral's smoke detection system went into an alarm state at about 6:10 pm. It did what it was meant to do: sense that smoke was present and sound an alarm to notify someone.

• The notification was sent to a single station manned by a single attendant – a single point of failure. As bad luck would have it, the employee on duty that evening was new – it was his third day on the job.

• The smoke detection system message that the monitor attendant received was a mix of common language and numeric codes. The information had to be manually decoded and subsequently communicated to a single security person within the cathedral.

• Once the message was decoded and relayed to the security guard at the cathedral, the guard responded by going to the wrong location – to the Sacristy, a building used for storage that was attached to the side of the Church. This misdirection likely occurred because the decoded alarm notification indicated that smoke had been detected in the Attic Nave Sacristy – a location that did not actually exist.

• Upon arriving outside the Church and looking into the Sacristy, the guard called the alarm attendant back, stating no fire was present. But the smoke detection alarm persisted.

• The attendant tried to reach his boss to clarify the situation but was unable to connect with him. Approximately 10 minutes later, his supervisor called back and instructed the attendant to tell the guard to go up to the church nave's attic – a steep and lengthy climb into the forest – where the fire's presence was subsequently confirmed.

Manual confirmation of the fire was delayed, and so was the notification of the Parisian fire department – by 30 minutes – 30 minutes the great cathedral did not have to spare.

Mapping gaps in healthcare communication

The disaster at the Notre Dame Cathedral was primarily due to breakdowns in communication. For healthcare leaders, it is especially important to note because communication errors are among the most common precipitating factors in hospital sentinel events. A communication delay, missed information, or a miscommunication can lead to a cascade of events increasing over time the degree to which the system fails. It happened at Notre Dame and it happens in hospitals, where patients are at risk.

Monitoring systems – or what I will call incident detection and response systems – are designed to shorten the time-

to-act in response to an event. In your hospital's systems, how many events are constantly taking place, and how many clinical and operational systems are sending alerts about these events? Too many to count. Lab systems are constantly churning out results (think COVID-19 test results as but one example) that need to be monitored, messaged, and acted upon. Patient monitors, radiology systems, and more have similar responsibilities.

And then there are the host of operational systems for throughput, bed availability, and the like. If we look closely, are there communication weaknesses that could result in a disaster?

Notre Dame Cathedral had only one major system to monitor and it failed. What makes a hospital 'smart' is its ability to coordinate and make use of multiple interrelated detection and response system simultaneously, so that your clinical and administrative operations are optimized. The only way to accomplish this is to have a communication platform that can interoperate between various clinical and operational systems, aggregating the data from the disparate systems and putting rules around that information.

By doing it this way, data is turned into actionable information, which can be communicated directly to the person who needs to know it. Data integration, aggregation, transformation and communication are hallmarks of the modern communication and collaboration platform, including the Vocera Platform. The communication and collaboration system is a fundamental component of a smart or real-time health system.

Designing a real-time health system

How does an intelligent communication platform work? Interoperability is key. Data from the EHR, nurse call, location

systems, lab, pharmacy, etc., are all considered inputs to the platform. The data is aggregated and subsequently integrated and rules written that transforms individual pieces of data into meaningful and actionable information.

In the case of COVID-19, an intelligent communication platform enables the following workflow to take place: A patient has been admitted from the emergency department with a presumptive diagnosis of COVID-19. It is very important that staff get the result of his diagnostic test back as soon as possible, whether positive or negative.

When the COVID-19 test has been resulted and added to the patient's EHR record, it triggers an automatic communication. The Vocera platform knows which room the patient is in from the EHR ADT feed, and it also knows which nurses are currently caring for the patient based on role assignments made at the beginning of the shift. It also knows which nurse is actually available based on presence information.

The test result can be immediately sent to the patient's available nurse along with other relevant clinical information. If there is no confirmation of receipt by the first nurse, the message can be automatically escalated to one or more people until the delivery has been confirmed. This automated process gets the information into the hands of someone who can act on it as soon as possible, and it eliminates the burden of the nursing staff from needing to constantly look into the EHR to see if the result is back yet.

It is important to note that if one of the patient's nurse is responding to a code or emergency intubation, her system presence status can be updated either by rule or manually so that she's skipped over for messages during the period of time that she's involved in the high priority activity. If the nurse accepts a code alarm, a rule could automatically make her 'unavailable' – or for any other reason she could easily make herself temporarily unavailable.

With that knowledge, what ordinarily might have interrupted the nurse, would skip her entirely and move to whomever is backing her up. This intelligent system understands presence, improves response times, and reduces interruption fatigue and cognitive overload on care team members.

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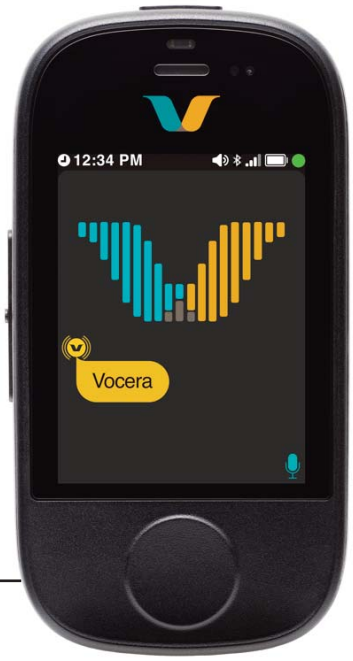

Applying lessons learned: Fire to pandemic

Okay, so what exactly can we learn from what happened in Paris and apply it to our current situation? While it might be tempting to lay the blame on the alarm attendant, it was really system design that led to the disastrous fire.

• Eliminate single points of failure. Build in smart automatic escalations for critical communications. And include clear concise contextual information. In order to make decisions, staff need not just the alarm result, they need immediate access to the context. At Notre Dame, the context of the alarm was the location information, which was neither clear nor precise.

• Send the right information to the right person on the right device. Using modern digital systems, communications can be made almost instantaneous by using multiple modalities. There is a time for voice chats and a time for text chats, and both need to be available.

• Automate the delivery of critical information. Alarms are just one source of decision-support messaging. We can reduce points-of-failure in the chain of communication by automating the delivery of critical information to those who are best prepared to react. In Paris, the smoke alarm did not go directly to the fire department. The information could

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have been sent directly to both the fire department and the internal security personnel on their mobile device.

• Trust your alarm monitoring system. If you build an automatic alarm escalation, measure the activity before taking it live. Measure the true and false positive rate. When responding to an alarm, the key statistic to focus on is the positive predictive value: what's the chance that the alarm is real? Maintaining a high positive predictive value for your alarms, in aggregate, is a key to preventing alarm – or interruption – fatigue.

• Leverage communication systems that provide 'presence' – who is or is not available?

• Simplify processes. At Notre Dame, the sensing system, monitoring person, escalation paths, and responders were not united on one communication platform. This makes handoffs more complicated, and post-hoc analysis of events more difficult. In a hospital, if your nurses receive information about labs on one system but have to use another to contact physicians about the result, information must be retyped – increasing work for the nurse and bringing in the potential for errors of both omission and commission.

• Provide the right equipment to your staff members. There was no reason the alarm information could not have gone directly to the guard inside the cathedral through a smartphone app or a dedicated device. Similarly, the message could have gone to the guard for action and to the fire department as a 'tap on the shoulder' – modern systems can be customized to meet specific needs.

Finally, COVID-19 places an additional burden on you to provide communication options while protecting your staff and preserving your supply of personal protective equipment (PPE). In the midst of the pandemic, it has never been more critical to keep staff and patients safe and connected with each other. If basic communication is difficult, or, in fact hazardous to your staff, then redesign your processes before disaster strikes. Care team members risk self-contamination if they are forced to doff PPE in order to communicate. Empower your staff with just-in-time information and the latest protective equipment, which includes hands-free communication worn under PPE.

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