

## Cuyuna Regional Medical Center

### Hospital Implements Wireless Communication System to Improve Patient Flow in the Peri-operative Department

Streamlined communication improves patient care, throughput, and drives efficiencies

#### Abstract

Cuyuna Regional Medical Center (CRMC) developed a unique and innovative surgical program that attracted top surgeons and accelerated demand on their peri-operative services. This increased demand placed communication challenges on hospital staff and strained the capacity of their facility and resources. Due to space limitations, building more rooms was not an option. Driven by a technology-savvy team of clinicians and their commitment to excellence, the hospital chose the Vocera® Communication System as the right solution to improve communication, patient throughput, and enhance productivity.

In a collaborative effort to demonstrate the benefits of the Vocera System, CRMC partnered with Vocera and Thomas Clancy, PhD, MBA, RN, FAAN Clinical Professor and Assistant Dean, School of Nursing at the University of Minnesota to validate a simulation model that Clancy created. This tool predicts the impact that Vocera will have on patient throughput and demonstrates that improved communication in critical areas such as the operating room will drive efficiencies that improve throughput and the patient experience. These improvements will be reflected in the capacity to increase patient volume and revenues, while decreasing labor expenses, which are all positive to the hospital's financial position.

As a result of the study after the implementation of the Vocera System, CRMC was able to show that a decrease in the distribution, frequency, and duration of events associated with delays in the peri-operative area decreased cycle time by 5%, resulting in a savings of roughly 15 minutes per case. This time savings allowed CRMC the capacity to increase patient flow through the peri-operative area by up to 253 cases per year. CRMC was also able to show that if they performed no additional cases, they would have the potential to do the same amount of cases more efficiently, at a labor cost savings of up to \$133,179/year. In addition, by positively impacting communication speed and effectiveness, employee satisfaction measurably improved.

#### Challenge

CRMC is a small hospital in rural Minnesota with five operating and two endoscopy suites. The hospital has worked diligently to establish an environment that attracts superb staff, including investing in state-of-the-art surgical technologies. When the hospital placed new advanced technologies to conduct minimally invasive surgeries, there was a demand for the operating room team to be more efficient. Communication had to be equally advanced to support CRMC's goal of providing top-tier surgical services.

Originally, the nursing staff relied on cell phones and legwork to track down colleagues, which was time consuming, frustrating, and frequently left accountability in question. This mode of contact left no mechanism for communicating to groups in situations like room turnover, patient transfer, request for anesthesia, and urgent situations. In the sterile environment of the OR, cell phones were inaccessible most of the time, although on occasion the circulating nurse was known to cradle his cell phone on his neck while trying to contact the recovery team while simultaneously assisting the surgeon with applying dressings or removing drapes.



“With Vocera, and the broadcast capability to a specific group of people with a particular job function, everyone hears the same thing.”

**Dr. Mark Gujer, MD**  
Director of Anesthesiology



## Solution

A cross-functional committee was formed to research ways to enhance communication and drive efficiencies. The committee looked at a variety of solutions, including Vocera, a system that features a wearable badge that provides hands-free communication at the point of care. Committee members made a site visit to a hospital that had implemented the Vocera System. After reviewing all the data, the committee selected Vocera for the operating room areas.



A 5% average cycle time reduction led to a 6.9% increase in surgical cases performed per day and a decrease of 5.6% in total labor expenses.

## Results

CRMC found in Vocera a state-of-the-art communication system that would allow them to support operating room staff in their pursuit of patient care excellence.

### Enhanced Communication and Efficiencies

Implementation of Vocera in the peri-operative services area has enhanced communication in several meaningful ways. Vocera eliminates the chatter associated with cell phones, and physicians report there is less background noise in the OR because there are fewer “annoying” cell phones ringing. Nurses are able to get answers to simple questions quickly and with fewer steps than before. For non-urgent matters, rather than spending time tracking people down, nurses have the option of leaving a message.

With the Vocera broadcast function, staff can quickly alert turnover teams, rally staff for educational in-services, or notify them that all procedures are done for the day. Notably, anesthesiologist, Dr. Mark Gujer, stated that it has revolutionized his workflow, and cut down on the number of communication transactions needed to get something done. He felt that with cell phones, frequently the message got distorted as it was passed from person to person. With Vocera, and the broadcast capability to a specific group of people with a particular job function, everyone hears the same thing. The Vocera System is also integrated with the phone system allowing staff and family of staff to reach the OR staff more quickly.

### More Teamwork

The improvements in communication and efficiencies have resulted in increased teamwork and accountability. Prior to using Vocera, getting several people to assist was very time consuming, frustrating, and could take the staff member away from the patient bedside. Today, staff members can get the help they need quickly and efficiently. Jon R. Rauen, MHA, MBA and Surgical Services Administrator for CRMC commented on the marked improvement in employee satisfaction by saying “To see staff participate in the assessment of Vocera and be won over was a very positive experience for our team.”

### Measuring Success

Demonstrating the success of each new technology deployed at CRMC is critical to adoption and future technology decisions. The partnership created with Tom Clancy and the University of Minnesota was a perfect opportunity to measure the impact of Vocera technology on OR processes.

Data elements were retrieved from the existing CRMC OR system for various peri-operative areas (see Table 1). During the study period, the OR staff at CRMC also collected data to include tracking every 15 minutes, the number of times they perform certain events (see Table 2), and estimates as to how much time these events took pre- and post-Vocera deployment. The staff also captured pedometer readings and completed staff perception surveys pre- and post-Vocera implementation.

Item	Value	Daily Staffing
Cases per year	4300	
Hours of operation	10 hours/day	
Pre-operative bays	11	8
Intra-operative rooms <sup>1</sup>	7	6
Post-operative bays	5	2

<sup>1</sup>5 operating rooms and 2 endoscopy suites

Table 2: Comparison of Event Dates

Type of Event	Pre-Vocera			Post-Vocera			Percent Difference in Average Delay Pre- and Post-Vocera	Percent Difference in Events per Surgical Case Pre- and Post-Vocera
	Percent of Total Events	Average Delay (seconds)	Events per Surgical Case	Percent of Total Events	Average Delay (seconds)	Events per Surgical Case		
Call placed and answered	42.47%	100	2.28	53.87%	65	1.063	-35.0%	-53.38%
Call received and answered	23.49%	100	1.21	13.60%	65	0.268	-35.0%	-77.85%
Call placed and message left	8.43%	66	0.5	9.07%	46	0.178	-30.3%	-64.40%
Call placed, put on hold, or transferred	6.13%	231	0.39	4.80%	108	0.094	-53.2%	-75.90%
Walked to a phone to answer a call	6.13%	173	0.32	1.33%	89	0.026	-48.6%	-91.88%
Physically searched for someone	4.77%	207	0.26	0.27%	135	0.005	-34.8%	-98.08%
Checked phone mail	4.51%	100	0.26	4.80%	65	0.0947	-35.0%	-63.58%
Call placed, put on hold and left a message	2.55%	197	0.15	8.00%	89	0.157	-54.8%	4.67%
Sent a text message	1.02%	183	0.06	0.80%	53	0.0157	-71.0%	-73.83%
Sent broadcast page to multiple staff	0.51%	228	0.03	3.47%	75	0.068	-67.1%	126.67%
<b>Average<sup>1</sup></b>		<b>118.71</b>	<b>5.46</b>		<b>68.02</b>	<b>1.97</b>	<b>-46.5%</b>	<b>-46.8%</b>

<sup>1</sup>The difference in the Average Delay and Events per Surgical Case, Pre- and Post-Vocera are significant at a p ≤ .01.

**Results**

Results from the study show that a decrease in the distribution, frequency, and duration of events in the peri-operative areas lead to an overall decrease in cycle time per surgical case. CRMC realized a 5% average cycle time reduction across the peri-operative areas. This decrease in cycle time per case led to a 6.9% increase in the number of surgical cases performed per day and a decrease in total labor expenses by 5.6% (see Table 3).

Table 3: Comparison of Productivity Indicators and Labor Costs

Item	Pre-Vocera	Post-Vocera	Percent Difference
Data collection period	4/1/11 – 10/31/11	11/1/11 – 12/31/11	
Total cases completed	2784	828	
Total days of surgery (excludes weekends)	151	42	
Average cases completed per day	18.4	19.7	6.9%
Average man-hours per case	15.8	15.4	-2.5%
Average steps walked per hour (operating room)	736.0	463.2	-37.1%
Average labor expense per case	\$555.00	\$524.00	-5.6%

On an annualized basis, a 5% improvement in cycle time is estimated to provide CRMC the capacity to increase surgical cases by up to 253 and gross revenue by \$2,117,104, while increasing labor expense by only \$142,439. Even if no additional cases were performed as a result of increased capacity, the operating room would have the potential to complete the same number of cases in less time due to the gained efficiencies. On an annualized basis, this would be equivalent to a savings of up to \$133,179 in total labor costs. Pedometer results showed a 37% reduction in steps, which equated to about one mile per person per eight hour shift.



CRMC was the first deployment of the new Vocera B3000 Badge. The customer-driven enhancements include better durability, advancements in speech recognition, and improved performance in noisy environments.

Surgical services staff completed a survey tool using a 6-point scale that compared their perception of the impact of Vocera on workflow before and after implementation (See Table 4). The greatest improvements in perception were in the following areas: improved ability to take a call with the hands-free aspect (33%); improving work productivity (35%), and contributing to effective communication (40%).

	1-6 Scale		Percent Improvement
	Pre-Vocera	Post-Vocera	
<b>1. The following activities are slowing down patient flow in my work area:</b>			
<b>A</b> The amount of time I spend trying to locate physicians and hospital staff by phone (being placed on hold, phone transfers, paging, leaving messages).	3.8	3.2	15%
<b>B</b> The amount of time I spend physically searching for physicians, staff, equipment, and supplies (searching from room to room, going to the nursing station, break areas).	4.1	3.3	19%
<b>C</b> The number of times I am interrupted in my work to answer phone calls (walking to the nearest phone, walking to the nursing station).	3.4	2.6	24%
<b>2. The amount of time I spend searching for physicians and hospital staff and being interrupted by phone calls (see 1A, 1B, and 1C) is:</b>			
<b>A</b> Impacting patient safety (falls, medical errors)	2.7	2.3	17%
<b>B</b> Reducing work productivity	4	2.6	35%
<b>C</b> Decreasing my job satisfaction	3.8	2.6	31%
<b>D</b> Decreasing patient satisfaction	3.9	2.8	29%
<b>E</b> Contributing to ineffective communication between the surgical team/coworkers (information gaps and fragmentation, miscommunication, redundancy, and inefficiency).	4.5	2.7	40%
<b>3. There are many times when I am physically unable to answer a call (wearing sterile gloves, positioning a patient, holding equipment).</b>	4.4	3	33%

## Conclusion

The future of healthcare will require different delivery models as well as technology to allow hospitals to be successful and thrive. CRMC recognizes this and demonstrates their innovative approach by improving individual and team practice patterns in the peri-operative environment with efficient communication with the Vocera Communication System. The net effect is the potential for a higher case output, or up to 253 cases on an annualized basis. Alternatively the same case load could be managed at a lower overall annualized labor cost of up to \$133,179/year. With Vocera, you can move patients through the peri-operative environment with peak efficiency, improving the patient and staff experience, and the hospital's bottom line.

In addition, with CRMC's data and others, Dr. Clancy and Vocera validated a predictive model that when based on a few critical peri-operative metrics, would forecast the financial impact of deploying Vocera. This predictive model can be used to help hospitals justify the incremental costs and quantify the value of the improvements that would be realized through the use of Vocera. If you would like to see how the predictive model can help you or for more information, call 888-9Vocera.



**About Thomas Clancy,**  
PhD, MBA, RN, FAAN Clinical Professor  
Assistant Dean for Faculty Practice,  
Partnerships, and Professional Development

Thomas Clancy, RN, MBA, PhD is a clinical professor at the School of Nursing, The University of Minnesota. Dr. Clancy teaches in the field of nursing informatics and specializes in systems design and clinical decision support in complex healthcare organizations. His research interests focus on optimizing healthcare processes through computational modeling and simulation.

### For More Information

Visit [www.vocera.com](http://www.vocera.com),  
email [info@vocera.com](mailto:info@vocera.com),  
or telephone 1-888-9-VOCERA  
(1-888-962-2372).



**Vocera Communications, Inc.**  
525 Race Street  
San Jose, CA 95126  
tel : +1 408 882 5100  
fax : +1 408 882 5101  
toll free : +1 888 9VOCERA  
[www.vocera.com](http://www.vocera.com)

**Vocera Communications UK Ltd.**  
100 Longwater Avenue  
Green Park  
Reading, Berkshire  
RG2 6GP  
United Kingdom  
tel : +44 0 844 335 1237  
fax : +44 0 118 945 0493  
[www.vocera.co.uk](http://www.vocera.co.uk)

**Vocera Canada**  
8 Market Street, Suite 300  
Toronto, Ontario  
M5E 1M6  
Canada  
tel : +1 416 923 2900  
fax : +1 416 923 2981