

# Case study

## *Ocean Springs Hospital*

### *Singing River Health System*





*Singing River's Ocean Springs Hospital on the Mississippi Gulf Coast managed to improve patient safety by using OR Cockpit, an integrated operating room solution with real-time patient and procedure information provided by Skytron LLC in conjunction with developing partner NewCompliance IT.*

**“The OR Cockpit allows us to monitor things that we would usually have to look up retrospectively, but now we can do it live. We feel that it is a huge patient safety improvement for us.”**

Tiffany Murdock, RN, Executive Director of Surgical Operations for  
Singing River Health System.

# Context

Ocean Springs is a teaching hospital with 11 operating rooms and 136 acute-care beds, which is part of the Singing River Health System with over 2,500 employees and more than 100,000 patients annually.

The hospital is a frontrunner in implementation of innovative medical technology. With the goal to further improve patient safety, efficiency and communication throughout the surgical department, Ocean Springs chose to implement OR Cockpit in both the pre-operative holding area, the operating rooms and the post-anesthesia care unit (PACU) in 2017.

OR Cockpit obtains patient and procedure information from various information systems and displays these data in real-time on large dashboards in- and outside the OR, while comparing it to safety protocols and quality parameters. In addition to providing real-time information, OR Cockpit offers a smart analytics platform which creates insight in quality and efficiency trends over time and generates intel reports.

These may be used to highlight parameters that need improvement, fuel discussion among staff, enhance workflows and continuously support process improvement cycles to drive changes. After implementation of the OR Cockpit, Skytron and NewCompliance continue to support hospitals with setting and following-up on realistic improvement goals for the future, in order to maximize the impact on patient safety and efficiency.



## Results at Ocean Springs

Ocean Springs has recently received the highest patient safety grade in the region and was recognized among the nation's safest hospitals by The Leapfrog Group.<sup>1,2</sup> This grade was based on their excellent performance in prevention of medical errors, injuries, accidents, infections and other harm to patients in their care. Since its introduction in 2017, OR Cockpit has assisted Ocean Springs with improving these areas by providing real-time feedback and analytics on crucial patient safety parameters.

### Surgical Complications

One of those patient safety parameters is compliance to the WHO Surgical Safety Checklist.<sup>3</sup> The OR Cockpit visualizes the elements of the Surgical Safety Checklist at the appropriate moments of surgery, enabling completion of the checklist by the surgical team on the dashboard, and gives a reminder if the checklist is incomplete. Compliance rates to the checklist elements per surgical case, team, specialism or entire department over time can be analyzed in the reporting tool for future improvement efforts. These insights enabled Ocean Springs to improve both time out and sign out completion rates after introduction of the OR Cockpit. When comparing the first six months after implementation (October 2017 - March 2018) with the most recent six month period (September 2019 - February 2020), it is seen that the average time out completion rate went up from 81% to 92%, a 13% relative increase (see Figure 1). The average sign out completion rate went up from 60% to 87%, a steep 45% relative increase (see Figure 2).



Figures 1 & 2. Surgical Safety Checklist time out (left) and sign out (right) completion rates over time since OR Cockpit implementation (October 2017) until February 2020 in Ocean Springs hospital.

Multiple scientific studies indicate that adverse events rates may be reduced by as much as 36-42% by using the Surgical Safety Checklist, and inpatient mortality within 30 days after surgery by 47%.<sup>3,4,7,8</sup> Therefore, increasing Surgical Safety Checklist compliance automatically improves patient safety. In addition, preventing patient harm reduces costs: each major surgical complication costs an additional \$13,372 (in 2010 USD),<sup>8</sup> while additional length of hospital stay due to medical errors is estimated to account for \$9.3 billion excess annual charges in the US.<sup>5</sup> It has previously been shown that mean length of stay can be reduced by 0.8 days per patient by compliance to the Surgical Safety Checklist.<sup>7</sup>

**The WHO Surgical Safety Checklist** consists of multiple elements: a sign in procedure at start of surgery, time out procedure during surgery and sign out procedure after surgery. It was designed to improve surgical team communication and consistency of care, in order to reduce the risk of complications and deaths associated with surgery by reducing errors.<sup>3,4</sup> These still are a serious problem in surgery: one in every five patients who undergo a surgical procedure experience some kind of harm, of which at least half could be prevented.<sup>5</sup> The consequences of 18.3% of all occurring patient harm are severe (causing prolonged or permanent disability) and of 3.6% even fatal.<sup>5,6</sup>

## Surgical Site Infections

Surgical site infections (SSIs) still occur in 2-5% of patients who underwent surgery, which is most likely an underestimation of the real scope of the problem due to underreporting.<sup>9,10</sup> SSIs are both deadly and costly: they increase the risk of mortality by 2-11 times compared with patients who underwent surgery but did not develop an SSI,<sup>9</sup> while the incremental cost per SSI is estimated to range from \$15,927 to \$25,546 (in 2005 USD).<sup>10</sup> It is estimated that as many as 55% of all SSIs may be preventable by implementation and compliance to evidence-based measures, such as timely administration of prophylactic antibiotics (if indicated), perioperative patient normothermia, and limiting the number of door movements during surgery.<sup>11</sup>

Each of these parameters are now visualized in real time on OR Cockpit dashboards to reduce SSI risks. In addition, environmental air quality conditions and the status of OR ventilation systems are monitored and visualized. The analysis tool provides intelligence to retrospectively identify potential causes and best practices to reduce SSI risks.

In Ocean Springs, it was seen that compliance to a combination of evidence-based measures (taken together called the 'OR Cockpit SSI prevention bundle') went up from on average 53% to 82%: a 54% relative increase (see Figure 3). This result is significant since the SSI prevention bundle was recently found to reduce the risk of SSIs by 20-40%, with an established dose-response relationship (meaning that an increase in compliance leads to a proportional decreased risk of SSIs).<sup>12</sup> In addition, the analysis tool enabled the creation of reports to show performance on patient safety parameters, which ensured Ocean Springs' compliance with Joint Commission and DNV Hospital Accreditation requirements.

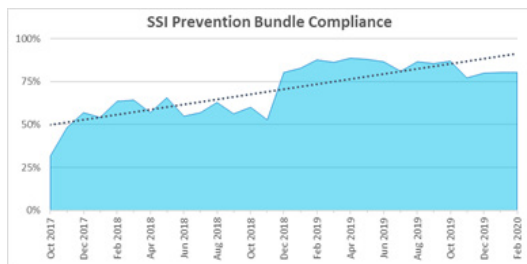


Figure 3. Compliance to each of the SSI prevention bundle parameters over time since OR Cockpit implementation (October 2017) until February 2020 in Ocean Springs hospital.

**“The OR Cockpit gives us that tool we need to provide our patients cutting-edge technology and superior patient safety, as well as optimal patient outcomes.”**

Beth Zender, RN, Staff Development & Performance Improvement Coordinator  
for Singing River Health System:

## Patient Safety Score

It may be hard to keep track of each separate patient safety parameter during surgical procedures and when analyzing the data. To this end, OR Cockpit incorporates a composite Patient Safety Score to indicate at a glance how safe a surgical procedure is (or was) for the patient. This score is calculated and visualized at the end of each procedure by an algorithm based on various patient safety parameters, which are all proven to contribute to decreases in both surgical errors and SSIs. The exact parameters in this algorithm are variable and depend on the specific hospital's improvement goals and preferences.

In Ocean Springs, the measures include a combination of compliance to the door movement protocols, WHO Surgical Safety checklist completion and timely administration of prophylactic antibiotics. Reflecting previously described improvements in compliance to the Surgical Safety Checklist and the SSI prevention bundle, Ocean Springs' patient safety scores improved from roughly 51% to 78% (+54%, see Figure 4).

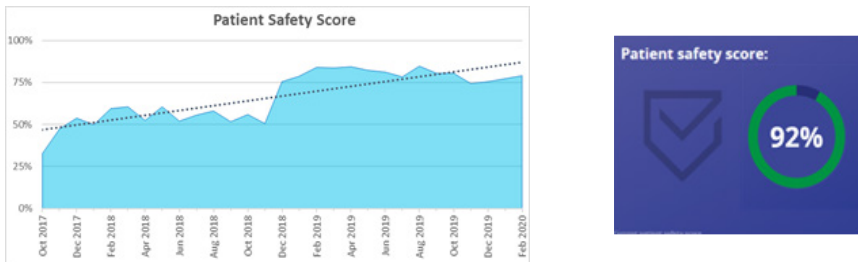


Figure 4. Patient Safety Scores over time since OR Cockpit implementation (October 2017) until February 2020 in Ocean Springs hospital.

By creating insights into data that were not available before, OR Cockpit has driven changes in this hospital which demonstrably have led to increased patient safety, improved outcomes and value.



## References

1. Ocean Springs Hospital Awarded 'A' for Patient Safety. Singing River Health System <https://singingriverhealthsystem.com/2019/05/ocean-springs-hospital-safety-grade-leapfrog/> (2019).
2. Head of the Class! Pascagoula and Ocean Springs Hospitals Nationally Recognized with 'A's from The Leapfrog Group - Singing River Health Sytem. <https://singingriverhealthsystem.com/2020/05/pascagoula-and-ocean-springs-hospitals-nationally-recognized-patient-safety/>.
3. Haynes, A. B. et al. A surgical safety checklist to reduce morbidity and mortality in a global population. *N. Engl. J. Med.* 360, 491–499 (2009).
4. Safe Surgery Saves Lives. World Health Organization [https://www.who.int/patientsafety/safesurgery/faq\\_introduction/en/#Q4.3](https://www.who.int/patientsafety/safesurgery/faq_introduction/en/#Q4.3) (2014).
5. Panagioti, M. et al. Prevalence, severity, and nature of preventable patient harm across medical care settings: Systematic review and meta-analysis. *BMJ* 366, (2019).
6. Anderson, O., Davis, R., Hanna, G. B. & Vincent, C. A. Surgical adverse events: A systematic review. *Am. J. Surg.* 206, 253–262 (2013).
7. Haugen, A. S. et al. Effect of the World Health Organization Checklist on Patient Outcomes: A Stepped Wedge Cluster Randomized Controlled Trial. *Ann. Surg.* 261, 821–828 (2015).
8. Semel, M. E. et al. Adopting a surgical safety checklist could save money and improve the quality of care in U.S. hospitals. *Health Aff.* 29, 1593–1599 (2010).
9. Anderson, D. J. et al. Strategies to Prevent Surgical Site Infections in Acute Care Hospitals: 2014 Update. *Infect. Control Hosp. Epidemiol.* 35, 605–627 (2014).
10. Berriós-Torres, S. I. et al. Centers for disease control and prevention guideline for the prevention of surgical site infection, 2017. *JAMA Surg.* 152, 784–791 (2017).
11. Umscheid, C. A. et al. Estimating the Proportion of Healthcare-Associated Infections That Are Reasonably Preventable and the Related Mortality and Costs. *Infect. Control Hosp. Epidemiol.* 32, 101–114 (2011).
12. Dutch National Institute for Public Health and the Environment, R. Naleven van de VMS-POWI bundel vermindert de kans op een POWI significant. [https://www.rivm.nl/sites/default/files/2018-11/VMS-POWI\\_%28M.Koek-PREZIES%29.pdf](https://www.rivm.nl/sites/default/files/2018-11/VMS-POWI_%28M.Koek-PREZIES%29.pdf) (2016).