

EXPLORATIONS



How Evidence-Based Design and  
**LEAN**  
**PHILOSOPHIES**

Worked Together to Create a Flexible Prototype Unit for  
UW Health

A Project Brief on Process-Driven Design: Lean at UW Health, Madison, WI

**INSIDE YOU WILL LEARN ABOUT:**

How a unit redesign for UW Health will serve as a prototype for future redesign projects.

Why the new unit must be flexible to respond to a variety of staff and patient needs.

How a multidisciplinary team used a range of observational findings and current literature to inform the overall design process.

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## Multidisciplinary Team Relies on EBD and Lean Philosophies to Create a Flexible Prototype Unit for UW Health

*UW Health, Madison, WI*

### THE GOAL

UW Health wanted to create an ideal-state prototype unit that supports collaboration and increases time spent delivering care and at the bedside, while reducing wasteful events that drain energy and time.

### THE CHALLENGE

At the onset of this project, the design team didn't yet know which unit would be relocated into the new design. This meant that they had to create a highly adaptable design that could serve a variety of situations and needs.

### Objective

UW Health in Madison, Wisconsin, is an integrated health system that's part of the University of Wisconsin-Madison. They recently contracted with HGA, Inc., to create a new design prototype that could be used to relocate one of the system's older inpatient specialty units. This design needed to be flexible enough to replicate for a variety of other units with different needs as the system moved forward with additional plans to modernize its infrastructure.

The goal of the new design was to support patient care at the bedside and to eliminate unnecessary movement for patients and staff, with the overarching goal of better patient outcomes and improved staff satisfaction. The project also explored how to support multidisciplinary collaboration among staff, patients, and families, both on the unit and off site.

"To guide our efforts, we started out by studying the ideal present and future states. We also looked at other units within the health system to understand what is working and to determine the different variables that we could adjust," says Kiki Werkheiser, EDAC, CLSSGB, Work Process Specialist, HGA, Inc.

She points out that a strong component of the UW Health project was the fact that it brought together a large multidisciplinary team, including medical and support staff, as well as representatives from UW Health's Patient and Family Advisory Council, to help guide the design process.

The project also relied heavily on both Lean and evidence-based design (EBD) principles to create the most efficient plan for the new unit. "Lean is an important part of our culture, as is evidence-based design. Our goal is to always merge these two methodologies to achieve the best possible outcomes," says Kara Freihofer, PhD, EDAC, Research Specialist for HGA, Inc.



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According to Freihoefer, since UW Health was an academic setting, the staff was particularly receptive to using the latest evidence and strategies to validate and guide their decisions. Furthermore, evidence collected through observation, patient/family questionnaires, lessons learned from other units, and existing literature in the field were instrumental in helping to establish Critical-to-Quality (CTQ) criteria to evaluate needs and inform the design process.

Two sets of CTQ criteria were developed: one at the room level, and one at the unit level. These CTQs included decentralizing nursing to promote patient-side charting and visualization, reducing noise to support a healing environment, and promoting patient and family satisfaction and privacy.

“We used these CTQs throughout the rest of the process in our decision-making. We did a variety of exercises using prototypes and mock-ups, and for all of them, we always came back to CTQs to see how our model aligns with our original goals,” Werkheiser says.

### Challenges

The biggest challenge the design team faced was starting pre-design without knowing the specific specialty that was ultimately going to be housed in the new space. “There was an overall attempt to develop a prototypical ideal state, yet it had to fit to the needs of the specific specialty that would ultimately be located into the redesign,” Freihoefer says.

To address this challenge, the designers conducted observational research on the unit they thought would most likely be moved to the new space (a hunch that turned out to be correct). They also observed other model units at a variety of UW Health facilities to find out how different design features were working. Ultimately, they collected and compared shadowing data on a total of four units to understand how workflows varied based on the location of chart stations, equipment, and storage.

“Of those four units, we also collected HCAHPS scores to see differences in patient satisfaction. Other metrics we looked at to guide our efforts included fall rates, number of injuries related to falls, and pressure ulcers, among other things,” says Freihoefer.



## KEY FINDINGS

- 1 A combination of Lean and evidence-based design principles served as a framework to bring together different members of the multidisciplinary team, which included medical and administrative staff, as well as patients and their families.
- 2 The designers relied on evidence—both published research and their own observations—to identify best practices to guide the new design.
- 3 The evidence was used to define key Critical-to-Quality goals that informed decision-making throughout the planning process.
- 4 Staff and family members tested design mock-ups in various exercises to see how they performed in the real world.

“We had to understand universal needs and make sure that, while we tailor the end result to a specific specialty, we don’t over-compensate for one specialty’s needs to the point that the design no longer functions flexibly,” she adds.

## Results

The eight steps of the EBD process played a critical role throughout the design process. “Whenever we presented evidence—our own, or from the literature—the multidisciplinary team just absorbed the information and really did apply the insights to help guide them in decision-making,” Freihoefer says.

For instance, the team explored the pros and cons of a decentralized model by looking at another unit that had taken this approach. They tried different workflows/spaghetti diagrams to see how the model would play out in addition to looking at past research, which showed that a decentralized model does not necessarily decrease face time among staff (a common concern).

They also explored mirror rooms versus same-handed rooms. Again, they turned to the literature to guide them, which showed no difference between the two in terms of efficiency. Rather, the literature suggests that providing staff with a universal view of their work zone and patients upon entry is more important (Stichler & McCullough, 2012; Pati, Carson, Harvey & Evans, 2010).

“We walked with staff to observe them on the job and sent a questionnaire to their patient and family advisory board. We gathered a lot of perceptions from everyone and discovered the pain points. We also used tools like value stream mapping to look at the patient journey and identify areas for improvement,” Freihoefer says.

“After we established all of these different insights, we tested some of them through physical exercises. We brought in different floor plans in extreme schemes. For instance, we took the idea of safety and then made the absolute safest floor plan possible. We pushed the edges in the most extreme way to test things and get people to talk about how things work,” she adds. “We were getting the perspective of family members, patients, and staff, so this was a wonderful blend of all of the different viewpoints.”



“We had a lot of stakeholders from different groups who were critical to the design process. Also, gathering explicitly defined information up front with the EBD approach and Lean really helped inform the decisions to be made.”

## Conclusion

“The level of engagement we had from day one was critical, and it lasted throughout the entire process,” Werkheiser says. “We had a lot of stakeholders from different groups who were very involved in the design process. Also, gathering explicitly defined information up front with the EBD approach and Lean really helped inform the decisions to be made.”

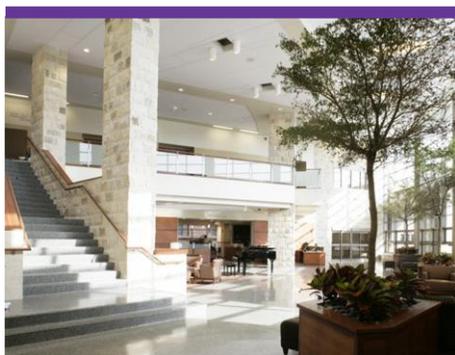


### *Stakeholder Engagement*

To this end, the organization used a variety of exercises: “We had mock-ups and a floorplan testing, and all this helped us test out the variables that people were concerned about. So the process, coupled with engagement, created a really great approach.”

Some of the ways Lean and EBD contributed to the architectural process included helping to identify and eliminate waste (such as inefficient placement of different unit elements, and supplies that would require extra travel time), as well as exploring safety concerns raised by patients that could be addressed through strategic changes to the workflow.

Since the unit has only recently opened, no post-occupancy evaluation has been done to validate the results. In the near future, though, the designers plan to use the eight EBD steps to measure how well the unit is performing and identify



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opportunities for improvement. “UW Health wants to learn from this unit as they plan for future renovations,” Werkheiser says.

Both Werkheiser and Freihoefer agree that the UW Health project was unique, both in the scope of the work and in the level of commitment they had from so many diverse groups.

“Really, to engage at this level for process improvement and for research, it comes down to the client and to the system we are working with, and to the people who make up the system,” Werkheiser says. “Our clients, because they respect this, trust it, and desire it, are differentiators in letting us work with them and be a partner in this process to make it really successful.”

Moreover, the Lean and EBD frameworks helped to smooth out the design process. “It can feel like a risk to invest time and effort into digging up all of this information and create a story of what is going on before we put pen to paper and begin the design process. We hope that the ROI on the back end will help justify the time, cost, and energy invested up front,” Freihoefer says.

“While academic partners seem particularly receptive to our process, I am seeing a shift in the industry where a growing number of organizations are beginning to embrace evidence to guide decisions,” she adds. “This is very encouraging, since it starts at the micro level to get to the macro. I can see that being the future of where we are going with EBD.”

## References

- Stichler, J. F., & McCullough, C. (2012). Same-Handed Patient Room Configurations: Anecdotal and Empirical Evidence. *Journal of Nursing Administration, 42*(3), 125.
- Pati, D., Cason, C., Harvey, T. E., & Evans, J. (2010). An empirical examination of patient room handedness in acute medical-surgical settings. *HERD, 4*(1), 11–33.