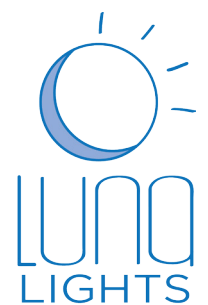


Case Study: Luna Lights Pilot Program

December, 2015



INTRODUCTIONS

Luna Lights

Luna Lights is an automated lighting system that uses data analytics to reduce fall risk. Without the use of wearables, an ultra thin bed pressure sensor turns portable lights on and off to safely guide older adults at night, while automatic alerts can be sent just in case there's an emergency. With automated reporting, resident behavior can also be analyzed over time, to help catch potential problems early.

At Luna Lights, we're keeping older adults aging happily and healthily in place - without compromise to their lifestyles. We're passionate about designing products that seamlessly integrate into their lives in ways that not only keep them safe, but also smiling.

LUNA LIGHTS PILOT: AT A GLANCE

Goals of the Pilot:

- Improve product functionality to better fit the needs of residents and caregivers
- Collect more data surrounding resident and caregiver nighttime behavior
- Analyze caregiver interaction with data analytics to improve care
- Show opportunities for value added to senior living communities

Fall History of the Participating Residents:

Based on 18 months of data provided by pilot site (data collected prior to pilot)

- Total number of falls among participants: 20
- Total number of nighttime (9pm to 7am) falls among participants: 10
- Percent of falls occurring at night for participants: 50.00%
- Average number of nighttime falls/month among participant population: 0.55

Quick-Facts:

- Pilot Start Date: Sept. 21, 2015
- Level of care: Assisted Living
- Total resident participation: 13 Residents
- Total number of nighttime (9pm to 7am) falls among all residents over 13 weeks: 1

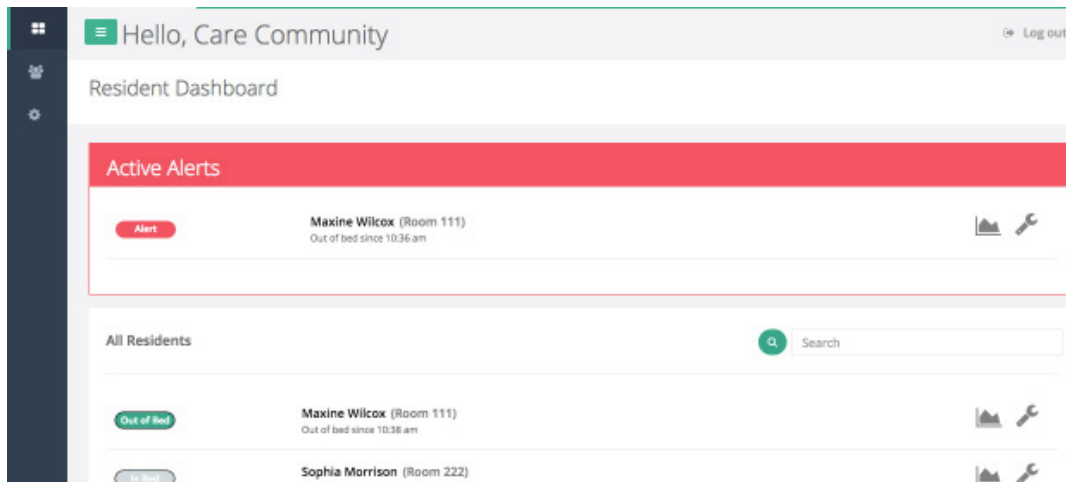


FINDINGS OF THE PILOT: DATA ANALYTICS

Fall Detection

On Thursday October 22nd, 2015, the Luna Lights system proved effective in detecting a fall in the community, outside of regular round times. That night a resident remained out of bed for an inordinate period of time, and Luna Lights sent a text alert to night staff, warning them of the fall.

FIGURE 1: CAREGIVER PORTAL



Luna Lights online dashboard for caregivers shows alerts and activity for participating residents

Through detecting and alerting caregivers of the fall, Luna Lights proved it can help nighttime staff respond more promptly to emergency situations than traditional methods of monitoring and detecting. The current standard of care relies on residents pulling a cord or pressing a button, which they may not always be able to do. Without a system like Luna Lights in place, a fall may not be noticed until the next routine check a few hours later or even the next day. Every alert Luna Lights sends is an opportunity to improve the quality of care: at that moment, the next morning, and over time.

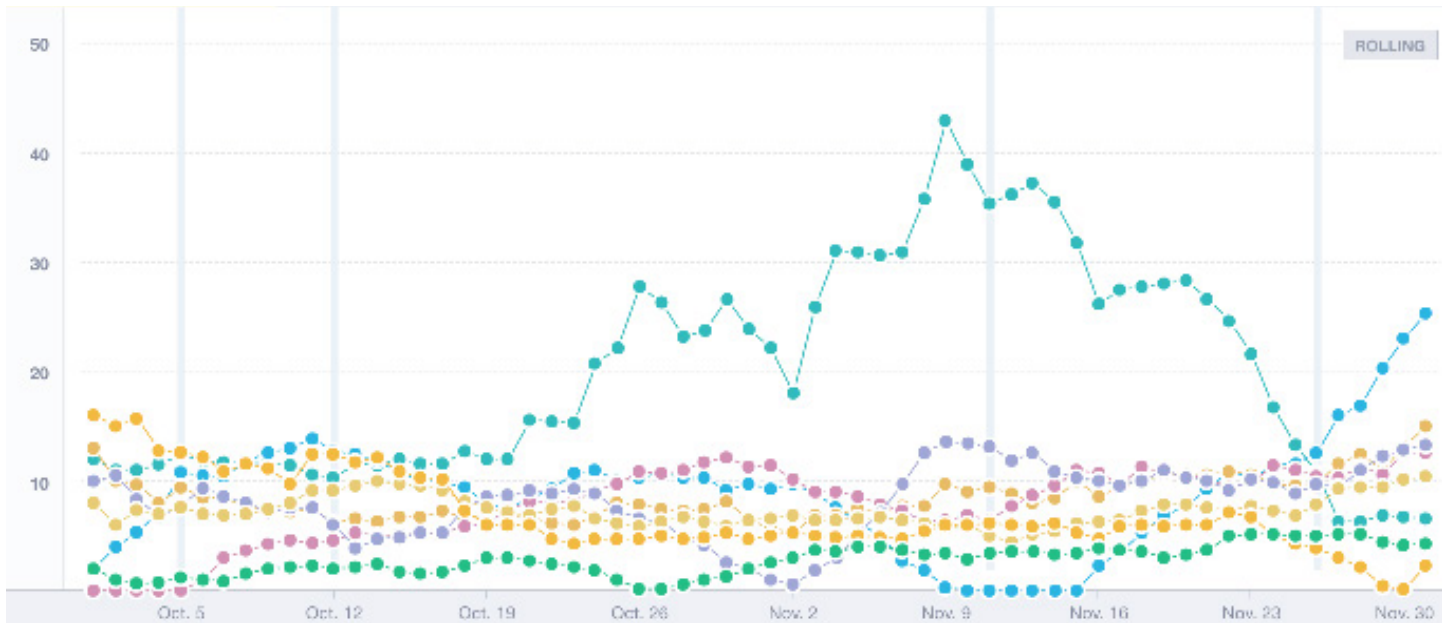
FINDINGS OF THE PILOT: DATA ANALYTICS (cont.)

Fall Predictability

Over time, Luna Lights tracks the nightly activity (including trips away from bed, as well as restlessness) of each individual resident. For many, over time their activity level remains consistent, predictable, and steady. Figure 2 shows that most residents stayed within a consistent range over several weeks. However, you will notice that one resident experienced a significant increase in activity over a one-month period (between Oct. 19th and Nov. 23rd). This resident's activity plots are significant in that the resident experienced a fall on October 22nd: both before and after the fall, activity levels were unusually high when compared to a previous 4-week baseline.

More testing is needed to confirm whether this increase in nightly activity, before and after a fall, is consistent among residents who experience a fall. If the trend proves consistent, then tracking nightly activity could have major implications for improving the quality of care in predicting and preventing falls among residents.

FIGURE 2: NIGHTLY ACTIVITY MONITORING



Luna Lights monitors nightly activity among residents including trips away from bed as well as restlessness. The teal resident experienced a fall on October 22nd.

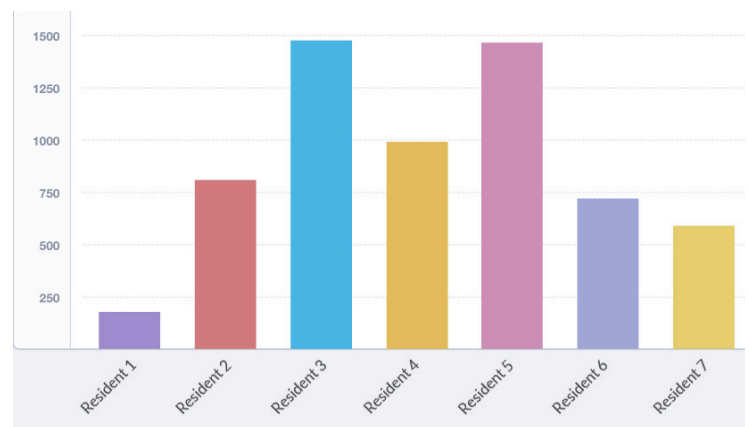
FINDINGS OF THE PILOT: DATA ANALYTICS (cont.)

Fall Risk

In addition to detecting and predicting falls, Luna Lights may be able to assist in identifying residents who are more likely to experience a fall. Figure 3 shows residents' nightly activity relative to their peers: those with higher activity have generally experienced more falls in the past and are known by caregivers to be more at risk of experiencing a fall in the future. Those with less nightly activity are known by caregivers to be more independent, and less likely to fall. Comparing residents' nightly activity could help establish relative nighttime fall risk. This information could help caregivers:

- Identify which residents need additional monitoring or assistance at night (to make sure pathways are clear, etc.)
- Understand fall risk of new residents in the community based on their nightly activity levels
- Understand change in risk level over time: if a resident's activity is increasing relative to peers, they may move to a higher risk category
- New staff can get up to speed more easily on which residents are more at-risk of a fall

FIGURE 3: RELATIVE FALL RISK



Compares nightly activity between residents over time; those with larger amounts of activity were generally noted to be a greater risk of falling than others

The ability to identify which residents are more at risk for a fall can help caregivers better treat and care for their residents, and ultimately could help prevent a fall.

FINDINGS OF THE PILOT: CAREGIVER FEEDBACK

Easy Integration

Staff in senior living communities are busy people, working hard to deliver the best care possible to their residents. One of the major concerns entering into the pilot was whether the Luna Lights system would overburden staff with additional tasks to be integrated into their workflow. Luna Lights proved ultimately to be seamless in integrating with staff workflow, currently sending an average of 3.2 alerts per night. These few alerts enabled staff to check on residents who had been out of bed for a period of time that is customizable for each resident, and ensure no long lay falls occur.

Continuity of Care

These alerts sent at night not only helped nighttime caregivers assist residents in real-time, but also provided daytime staff with information about how their residents had slept the night before. This data on sleeping habits enabled daytime staff to:

- Better understand and empathize with their residents (were they sleeping well, or did they have a bad night?)
- Identify residents who had had a rough night's sleep
- Ask these residents informed questions about how they slept and how they're feeling
- Potentially catch problems with a resident's health

Information about residents is often hard to capture and share between day and nighttime staff. Luna Lights acts as a conduit between the two shifts, capturing and delivering valuable information on residents to those working at night, as well as those caring for residents during the day.

“Getting alerts the next day helps me know what’s going on with residents at night, where before we had no idea. It helps me ask more questions and make sure they are OK.”

—Assisted Living Manager

FINDINGS OF THE PILOT: RESIDENT FEEDBACK

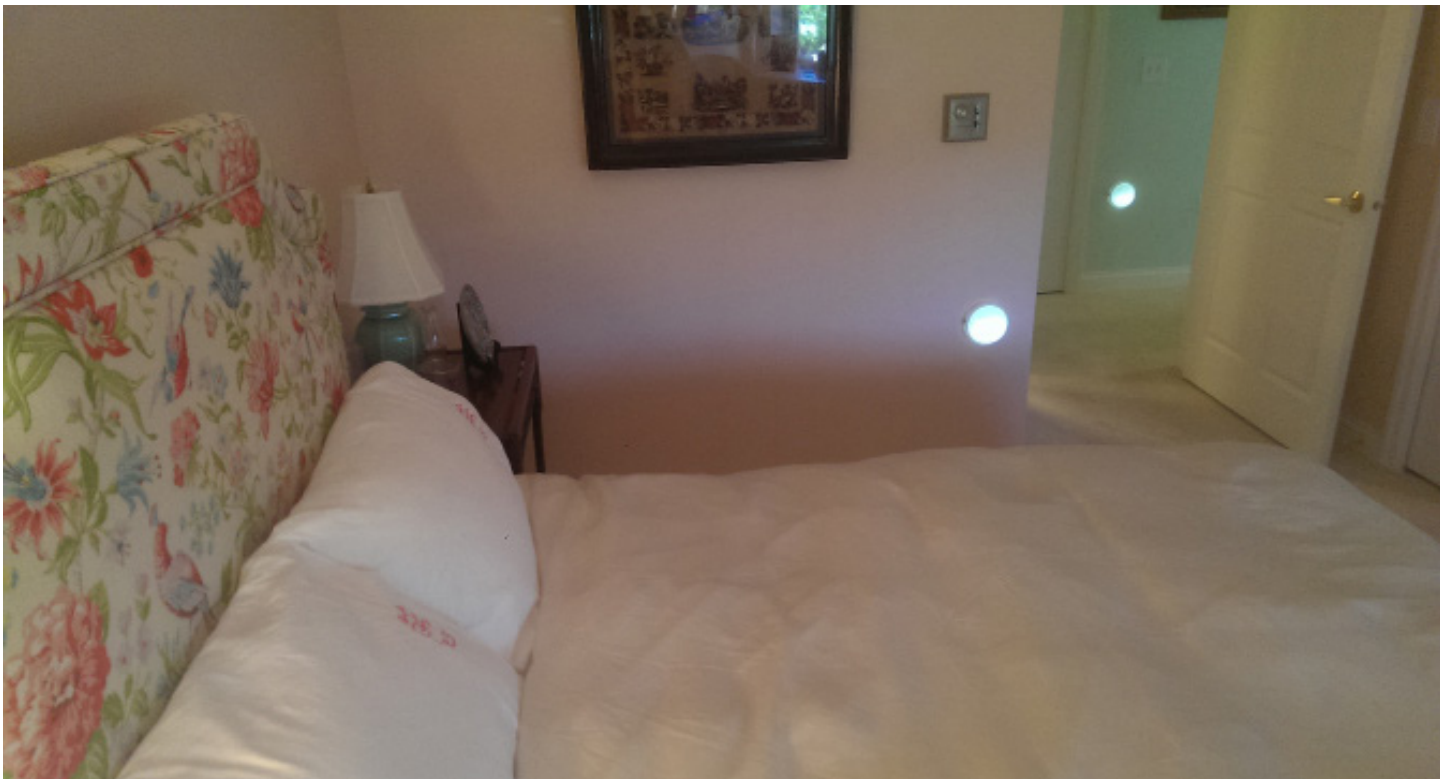
Ultimately, Luna Lights is a product designed for the user: the residents who interact with our system on a nightly basis. In working and talking with the residents, Luna Lights received notable feedback:

"This is a great invention."

"This is tied to the phones that [the caregivers] have, right? I think that's great."

"Oh yes, it gets very dark in here, and the lights come on and help when I get out of bed at night and go over to the bathroom."

"I can't feel the switch at all, I forget it's there."



FINAL THOUGHTS

Conclusions

The Luna Lights Pilot proved to be successful. The pilot allowed the Luna Lights team to vastly improve the product, while proving to be a valuable asset to the pilot location, its residents and its caregivers:

- Luna Lights system successfully detected and alerted caregivers of a fall more quickly than traditional methods
- Through tracking nighttime activity, data analytics could be used to predict falls (Figure 2) and identify individuals at 'high' risk' of a fall (Figure 3). More testing is needed to confirm this capability
- Luna Lights system easily integrated into the nighttime staff workflow, and allowed for better follow-up and continuity of care for daytime staff
- Residents enjoyed using the system, specifically the automated lights

Luna Lights provided clear value to both caregivers and residents, while fitting seamlessly into their workflow and daily lives. We pride ourselves on providing great service to both communities and residents in order to help provide the best care possible.

We look forward to continuing to make an impact with other communities and individuals. If you have any questions about Luna Lights, don't hesitate to reach out to Donovan Morrison, CEO, or Matt Wilcox, CTO:

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