



Enabling Preventative Care with TrueCare by ResMed

The First Holistic Health Intelligence Platform for
Late-Stage Independent Living, Assisted Living, and
Memory Care Communities
Results From a Collaboration Between Trillium Woods,
an LCS Community, and ResMed Inc.

The primary purpose for any senior living community is to provide an environment that promotes health and wellness, leading to higher quality-of-life for residents. By engaging in all dimensions of healthy living, it is possible to delay declines that come with aging by providing quicker identification and interventions to restore balance in the areas of wellness.

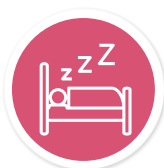
ResMed's TrueCare solution is the first holistic solution that enables those outcomes in senior living communities.

THE UNMET NEED IN SENIOR LIVING COMMUNITIES

In independent and assisted living sites of services, pre-acute health status of residents is characterized by three critical measurements:



Mobility



Sleep



Social connectedness

Senior living communities regularly face a care-delivery challenge due to having limited-to-no visibility to these measurements. These insights often only come in from self-reported incidents by residents or happenstance data from third parties such as food service providers, cleaners, bus drivers, and wellness providers.

This lack of timely objective information results in reactive interventions, only after a negative event, or when decline is well underway, negatively impacting residents, their families, caregivers, and senior living community leaders.



TRUECARE UNIQUELY MEETS

The needs of the resident and their family, caregivers, and senior living community leaders

TrueCare provides the care team with the tools and awareness needed to support the quality-of-life for residents.

For Families & Resident

The TrueCare offering is one of the tools available across the continuum of care when the resident needs it. This makes the offering be a resource that provides families with the initial comfort that they are making the right decision by having their family member move into a TrueCare equipped senior living community.

TrueCare proposes 24/7 monitoring of residents enabling to measure their well-being on a day-to-day basis, while ensuring that their privacy is respected through the use of passive sensors (no camera, no microphone, and no need to wear a device). The regular tracking of the metrics provides reassurance to family members through allowing proactive interventions in health and wellness – including supporting decisions to transition to a higher level of care.

By providing detailed insights to the care team, TrueCare enables communication with both the family and resident in a timely manner so the resident can retain their independence as long as possible and enjoy the highest possible quality-of-life as they age.

For Caregivers

TrueCare provides a complete picture of residents' pre-acute health through an easy-to-use dashboard providing predictive insights and context about the resident's daily life that allow proactive health and wellness steps to be taken that avoid or slow the rate of inevitable decline.

This monitoring of episodic events and pillars of health provides empirical data that enables informed conversations with family members about whether their relative is doing well, needs some additional resources such as exercise or sleep coaching, or if they need additional care either in the home or through the transition to a higher level of care.

As they usually have no or limited anecdotal information about the resident's life, senior living communities' care teams have no choice other than to react to the events or when decline has been underway for a while. TrueCare's constant monitoring and alert settings enable the care team to be more proactive in the residents' management.

Moreover, TrueCare reduces time spent collecting information on residents' health status, decreases time spent in team meetings for wellness planning and/or transition planning, and time spent collecting evidence to help families make new care decisions. These changes enable more effective allocation of staff resources in the delivery of care, leading to better resident outcomes and improved staff job satisfaction through the ability to provide impactful care.

Greater job satisfaction is likely to lead to higher staff retention rates, which is a key to a successful community, and a more cohesive team while the reduced turnover lowers new staff training costs and ensures more staff time is spent on providing care.

For Senior Living Community Leaders

TrueCare provides a differentiating tool to assist in gaining new residents and retaining the existing ones, each of which contributes to maintaining higher occupancy rates. The US Small Business Administration and US Chamber of Commerce estimates that acquiring new residents can cost as much as five-to-seven times more than retaining existing residents.

For existing residents, TrueCare makes it possible to extend the length of stay at their current level of care, thereby ensuring ongoing revenue streams and lower care costs for the community.

For residents who need a level of care beyond what the community can offer, TrueCare also assists in delaying the loss of revenue resulting from the resident moving to a new site that provides that higher level of care.



HOW TRUECARE WORKS



The TrueCare Vision

As the key component of a broader ResMed ecosystem, TrueCare enables preventative care via predictive insights from monitoring activities of daily living and electronic health record (EHR) context.



The TrueCare Solution

TrueCare's passive sensors capture daily living metrics (such as sleep, fall suspicion, interactions with other people, activity levels, and bathroom use) which are then combined with electronic health record (EHR) contextual data (medications, demographics, and health events) in one dashboard offering a comprehensive set of metrics (Fig. 1). The dashboard automatically provides caregivers with the latest insights based on AI analytics and personalized trends for each resident.

TrueCare

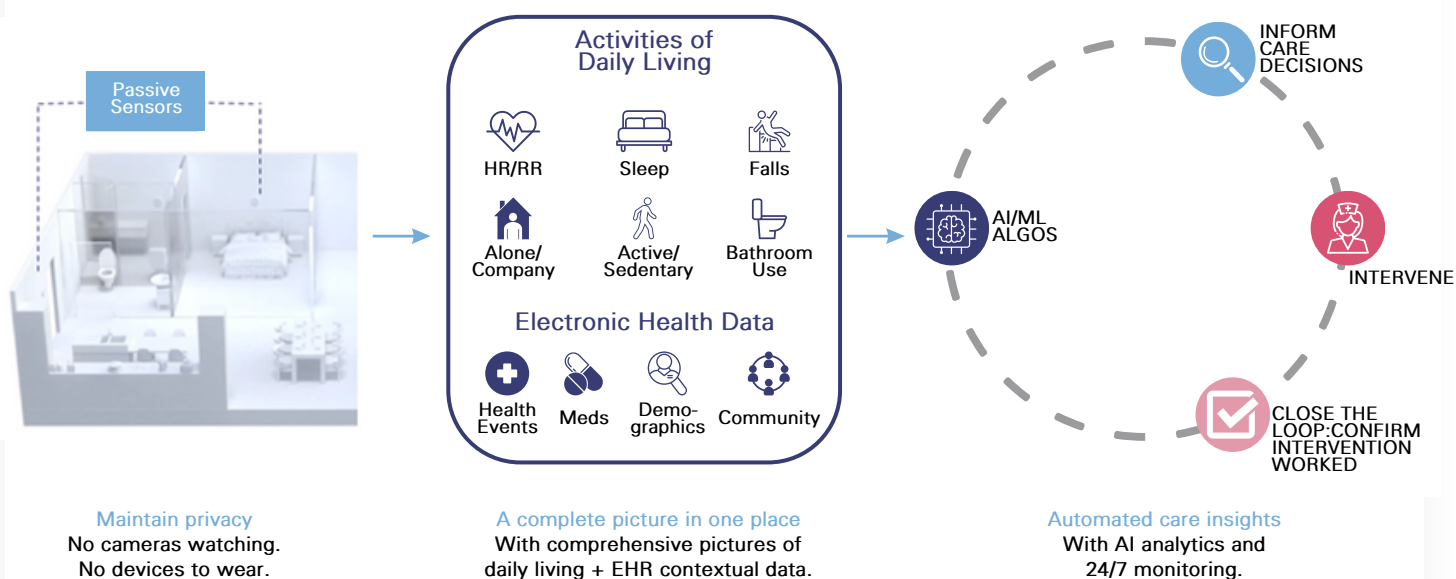


Fig. 1: TrueCare Health Intelligence Platform



The TrueCare Dashboards

Residents of concern are flagged based on automated insights in health status provided by TrueCare (Fig. 2), allowing the care staff to make informed decisions during their daily stand-up meetings and weekly transition meetings about the right time to provide care and proactively intervene with residents. The same information also serves as validation data for conversations with the resident's family members.



Fig. 2: TrueCare general dashboard provides important insights at a glance

The dashboard (Fig. 3) enables early detection of possible issues or resident's decline based on the five critical categories of measurements detailed below.



Fig. 3: TrueCare dashboard example



The Mobility Category Includes:

- **Tracking times of immobility/sitting:** Possible clinical indications to cause the immobility and increase in sitting time.
- **Obtaining a mobility score:** Detection of a decline in mobility would allow for early intervention preventing serious concerns, such as a fall, resulting in potential broken bones. Such interventions will eliminate unnecessary trips to the emergency room or other hospital stays.



The Stability Category Includes:

- **Unstable events:** Indicators in a resident's movements patterns that they are unstable, indicating that a possible future fall may be of concern.
- **Fall events and duration:** Detection of a fall event with the ability to automatically notify staff to allow for a response in assistance.

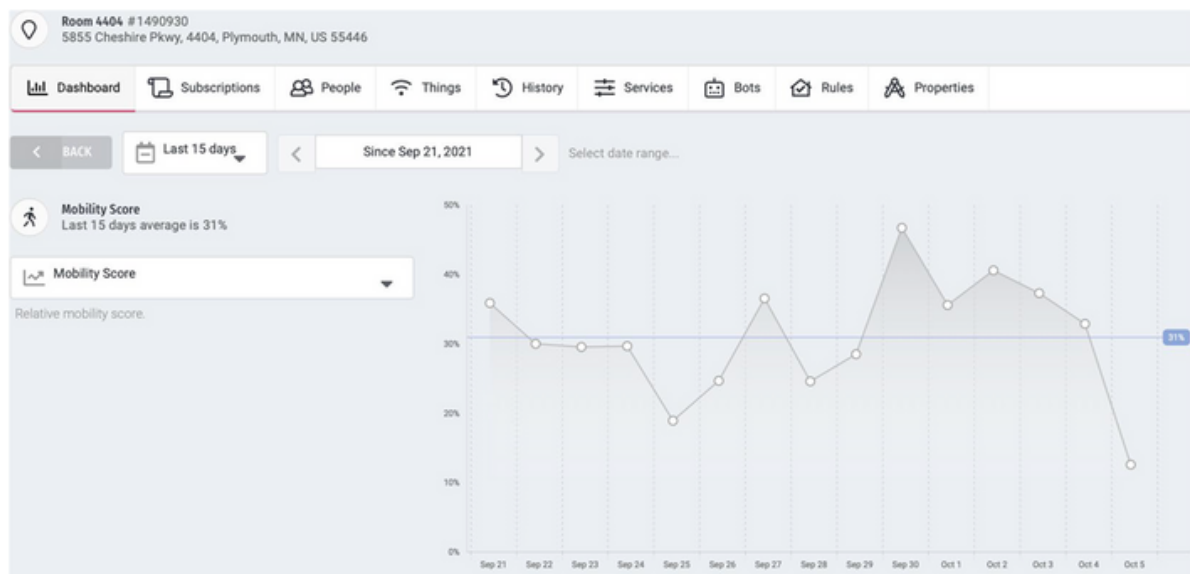


Fig. 4: Example of Mobility score evolution days after days



The Social Connectedness Measures Include:

- **Monitoring social activity:** Lack of socialization is indicative of depression, incontinence, contributes to cognitive decline and/or becoming isolated. Early detection would allow for encouragement and methods to get the resident engaged.
- **Monitoring visitors:** Relationships and connectivity are imperative to one's overall well-being. Lack of human interaction leads to depression, stress, isolation, and cognitive decline. Early detection would prevent the onset of the conditions listed.



The Sleep Measures Include:

- **Monitoring bedtimes:** After determining a lifestyle baseline, any changes could alert care staff to complete a wellness check. Again, early intervention to prevent serious health or wellness concerns.
- **Tracking times in bed:** Would provide alerts to further investigate and determine if there is a clinical concern.
- **Monitoring sleep duration:** Changes in sleep duration could signal multiple serious health concerns – dementia, pain, urinary tract infection, incontinence.
- **Monitoring wake time:** Changes in wake time could indicate possible medical concerns, including pain, urinary tract infections, increased stress, depression.
- **Monitoring naps:** Increase in naps or other sedentary activities could indicate a medical condition or depression, requiring further evaluation.



The Bathroom Measures Include:

- **Monitoring bathroom visits and duration:** Increase in visits and duration could indicate urinary tract infection, constipation, diarrhea, possible flu related visits, or other wellness concerns requiring further evaluation.
- **Monitoring hygiene:** A decrease in hygienic habits could indicate a change in cognition and/or indicate frailty or fear of falling in the shower.



TRILLIUM WOODS PILOT AND CASE STUDIES

Trillium Woods, an Life Care Service (LCS) community, is an innovation leader in senior living with focus on assessing new technologies that improve lives for their residents and families as well as the broader senior living ecosystem. Trillium Woods serves as a technology assessment location for LCS with focus on assessing tech-enabled solutions like TrueCare that improve quality-of-life for residents.

Trillium Woods initiated a pilot with TrueCare to both understand the potential value of the offering in impacting the quality-of-life for residents and then to share pilot study learnings with other community sites across the entire organization.

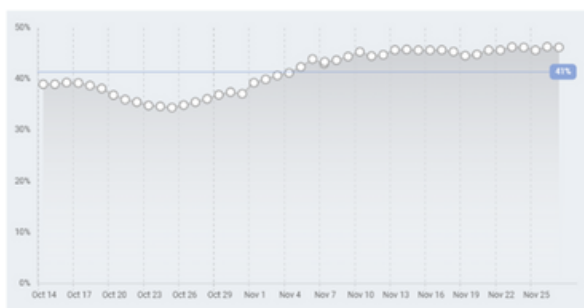
By being an active collaborator with ResMed in this early-stage pilot effort, the site was able to provide valuable inputs that led to further development and refinement of the TrueCare offering in ways that will translate into adding more value to their effort to impact the delivery of care for residents.

Case study #1

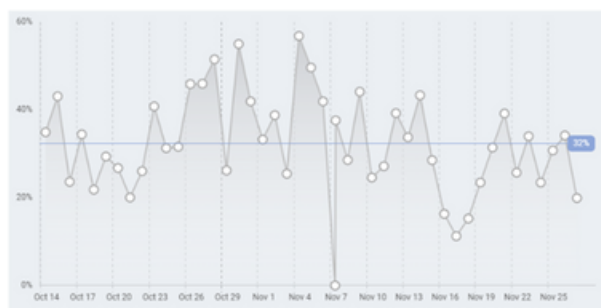
TrueCare confirms the resident is doing well

The resident's daughter was concerned about her mother's memory, sleep quality and activity level. The resident's health status was assessed across sleep, mobility, and bathroom patterns collection. A personalized baseline was established, and TrueCare assessed any changes that could indicate opportunities for improvement or concern of decline.

Over the two month reporting period, the resident's TrueCare score (Fig. 5A) and trends were stable relative to her baseline with no abrupt changes. Mobility scores showed occasional decreases for several days in a row, followed by recovery to baseline levels (Fig. 5B). In addition, bathroom patterns were normal with limited nighttime activity. Overall sleep scores were in ranges regarded as standard.



A. TrueCare Score



B. Mobility Score

Fig. 5: TrueCare (A) and Mobility (B) score details

Low mobility was episodic and may be part of the residents baseline patterns. The wellness team confirmed the resident is active and regularly reads outside her office. TrueCare supplements this knowledge with information about what activity looks like inside the residence living space. This baseline can be used going forward to continue to track frequency of mobility decreases to better understand need for additional intervention.

Overall, TrueCare insights suggested the resident is doing well and is a healthy 98 year old, aligning with the Trillium wellness team knowledge of her health status. The care team also confirmed the main insights collected by TrueCare are the ones needed for communicating with the family to reassure that mother is doing alright.



Case study #2

TrueCare adds context to falls and decline leading to transition

The resident was selected for the pilot due to high risk of falls. During the pilot period, the resident had a fall that was reported directly to the community. Although the fall happened outside the area covered by the TrueCare sensors, analysis was completed to better understand the circumstances leading to and following the falls.

Leading up to the fall, the resident spent a significant amount of time in bed at night and during the day two days in a row. The day before the fall, time spent in bed decreased to only 4 hours. Bathroom trends showed no unusual patterns or excessive nighttime activity. Following the fall, time in bed and sitting time increased significantly for several days. Significant fluctuation in both time in bed and mobility continued in the weeks following (Fig. 6).



Time in bed before and after fall (Oct 6)

Fig.6: Time in bed trends before and after the resident's fall

The insights from TrueCare served as additional context around the fall that otherwise may be difficult to collect. Significant time in bed and large fluctuations in activity levels was shown in TrueCare and confirmed to be an important indicator of decline. Further, Trillium Woods confirmed this information is valuable for discussions with families about what is happening for their loved ones and need for additional care. Shortly after this period, the resident transitioned to skilled nursing.

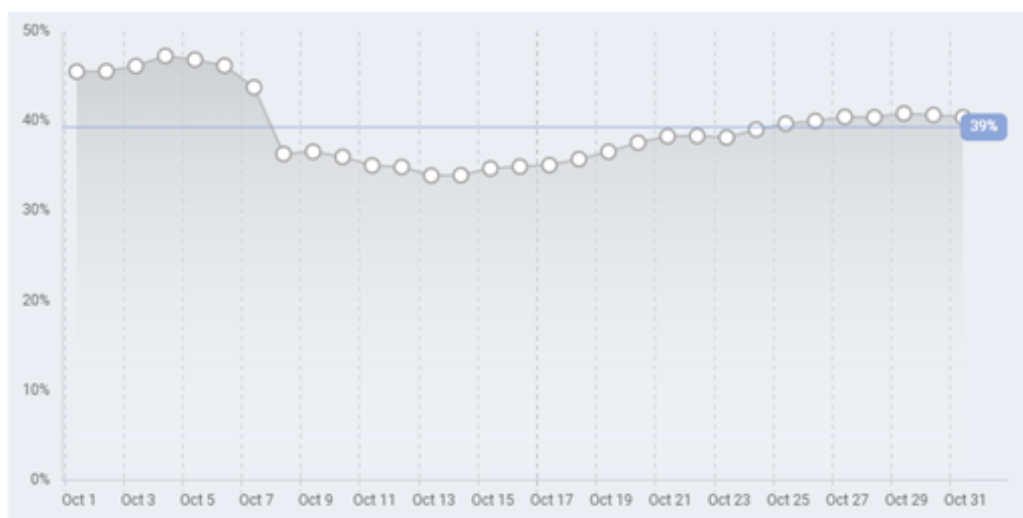
Case study #3

Sleep insights identify therapy; TrueCare score decreases with life event

The resident was looking to improve her sleep and recently had dizziness that may be associated with blood pressure medication. The resident was healthy and happy.

In the beginning of the pilot, sleep trends were seen to be healthy with 7+ hours of sleep at night and consistent wake and bedtimes. Mobility monitoring showed long sedentary periods, likely sitting in the living room. In the following weeks, the TrueCare score decreased abruptly and continued to decrease over several days. Her mobility score decreased significantly and was below baseline in the following week. The Trillium Woods team confirmed that the resident's husband had passed away during the same period and they observed that she was dosing off for long periods in the chair.

The TrueCare scored identified here changes associated with significant life events. TrueCare provides an opportunity to track the residents' health over time to better understand the impact of the care plan, gather evidence of success, and inform any adjustments needed to achieve desired outcomes. After this, Trillium Woods discussed several care options going forward.



TrueCare score decline

Fig. 7: Resident's TrueCare score, showing activity decline

TRILLIUM WOODS

PILOT CONCLUSIONS

In conclusion, the pilot achieved the objectives defined in the letter of intent by Trillium Woods and TrueCare. Through the evidence collected and improvements made to the TrueCare solution, the success criteria were achieved for each of the stakeholder value propositions.

Residents and Family

Five residents and their families showed interest in the TrueCare solution and agreed to participate in the pilot. For one resident, TrueCare provided information on their good health status, confirming the care team's thought and supporting evidence that the wellness navigator would be a valuable addition for conversations with family members. For residents that experienced decline and transition, TrueCare identified changes in health patterns consistent with those of decline and provided additional context that would be useful for decision making.

Caregivers

TrueCare achieved the criteria defined for optimizing care and supporting staff efficiency. Based on the care teams familiarity with the selected residents and occasional wellness checks, the team confirmed the TrueCare score accurately represented the current health status of the participating residents. Further, the care team confirmed that trends and insights collected during the pilot align with information they use for decisions on need for additional therapy or interventions. The TrueCare dashboard provides the most critical information to the care team, saving time spent on data collection and therefore allowing to increase the time spent on wellness and transition meetings. Moreover, this pilot demonstrated that for independent environments that are not a known risk, insights like significant increases in time in bed or large fluctuations in activity levels can be valuable to providers to indicate an opportunity to proactively check in on residents. It could be an opportunity to identify a fall that may be unreported.

Community Leadership

In addition to value to residents, family, and caregivers, the pilot provided examples of how TrueCare could support residents in low-cost settings and identify opportunities for therapies that are also revenue streams. One resident with cognitive decline was confirmed to be doing well in an independent setting and not in need of additional assistance. For another resident, mobility and sleep patterns helped Trillium identify an opportunity for exercise programs or physical therapy to help improve sleep quality. After her husband passed, the care team saw potential to use TrueCare metrics in parallel with wellness plans in order to track which activities were most effective and provide objective evidence of successful outcomes.