

Community Areas of Sustainable Care and Dementia Excellence (CASCADE)



FINAL REPORT

A process and technology evaluation of the CASCADE programme in
the United Kingdom implementation sites

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Preface

This report is a process and technology evaluation of Community Areas of Sustainable Care and Dementia Excellence in Europe (CASCADE) programme implementation in the United Kingdom (UK) sites. The report combines Outputs 2.2, 2.3, 2.4 and 2.5 of Work Package 3 ‘Evaluation’ of the CASCADE project focusing on implementation sites in the United Kingdom (UK). The CASCADE cross border partnership evolved from distinguished local needs for improved and sustainable care and support for the growing population of people living with dementia. The process evaluation drew on Moore et al.’s (2015) framework to explore experiences of the UK implementation sites during the CASCADE partnership with emphases on events that occurred before and during the COVID-19 pandemic. Multiple methods of data collection were used including interviews, written feedback and secondary sources of data.

Findings highlighted that local communities benefited from the new builds offering employment, space for social interactions and extra capacity for improved hospital patient flow. Medway Community Health (MCH) is on the step towards becoming a fully dementia friendly organisation while East Kent Hospitals University NHS Foundation Trust (EKHUFT) has implemented the CASCADE model of care in a local residential care home and it welcomed the first residents at Harmonia Village in June 2023. Harmony House at MCH continues to support the ongoing demand for step-up step-down care, particularly of older adults.

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Executive Summary

High levels of bed occupancy by older adults in general and acute hospital wards continue to create poor experiences of care and financial pressures on the National Health Service (NHS). A recent report by NHS England identified a hospital bed occupancy rate of 95.7% in January 2023 (NHS England, 2023).

The CASCADE cross-border partnership was formed to develop a sustainable model of care to address the rising cost of caring for older adults and people living with dementia. The CASCADE project had four delivery sites across Belgium and the UK. This report presents findings from a process evaluation of CASCADE programme implementation in the UK. The process evaluation identified that the project comprised numerous benefits, some of which were embedded in systems of local contexts. Lessons learned from developing the CASCADE model, although dependent on country and site contexts, can apply to improving dementia care services across countries.

The process evaluation key findings encompassed aspects of co-creating and implementing the CASCADE model in the UK, including during challenging times such as the COVID-19 pandemic. These included:

- Consulting widely with all stakeholders as well as experts in dementia to distinguish needs and preferences is an effective way of establishing the commitment to shared goals and creating synergies with existing processes.
- Dementia care specific facilities require a daylight opening offering views to the outdoors, and flexible furnishings particularly in the bedrooms to meet the needs of individuals. For example, the design of toilets should support assistance while maintaining dignity.
- Coordinating the décor with contrasting colours, consistent use of plain flooring and providing easy access to secure gardens enhances a sense of safety, homeliness and comfort for people living with dementia.
- Creating a designated space for indoor activities and other social interactions integrates the benefits of activity and social connections, which improve the wellbeing of people living with dementia.
- Using local resources for new builds enhances employment and business development opportunities.
- Community integrated dementia care improves hospital patient flow resulting in overall service improvements and increased capacity for acute care.
- The CASCADE model inspires reassurance in the quality and safety of dementia care.
- The CASCADE model improves interdisciplinary collaborations, experiences of people receiving care and staff wellbeing particularly during difficult times such as the COVID-19 pandemic.
- The dementia care workforce requires regular training and support with a practice-oriented approach to keep the fundamentals and components of the CASCADE model alive.

The CASCADE training programme is a legacy that will continue to support the learning and development of the health and care workforce and the development of dementia friendly communities.

- The original architecture may constrain the cost saving strategy of converting existing housing into a dementia care specific facility.
- The use of technology in the CASCADE UK delivery locations was varied and depended on several parameters including staff familiarity with the devices, resident acceptance of technology and significant delays in the introduction of such technology during the COVID-19 pandemic. Nonetheless, reported experiences of staff, residents and family members highlighted the significant potential of technology in supporting staff to spend quality time with residents in a person-centred model of care, enabling residents' independence within the facility and enhancing accurate monitoring of residents' overall health as well as behaviour management.
- In addition to varied challenges due to the COVID-19 pandemic, CASCADE programme implementation in the UK was not without other challenges. The fluctuation in currencies and the time lapse between funding application and implementation generated deficits in the budget for the new builds. Overall, the CASCADE project was reported to be time-intensive and the disjointed and truncated mode of implementation was a barrier to generating evidence for the cost-effectiveness of the CASCADE model methodically.



1. Introduction

The CASCADE project aimed to address common challenges associated with the rising cost of caring for older adults and people living with dementia. The overall goal of the CASCADE partnership was to develop a sustainable model, implement and evaluate the effectiveness of the model. The UK partnership comprised two implementation sites including Harmonia Village in Dover and Harmony House in Rochester. Harmonia Village has a capacity of 30 beds for long-term stays and six beds for short-term stays, while Harmony House can offer up to 20 guest rooms. Unfortunately, the COVID-19 pandemic interrupted the implementation of the CASCADE model at both sites therefore the evaluation strategy had to be adapted in light of ongoing challenges that both partners faced as a result of the pandemic crisis in the delivery of services in their organisations and the whole of the UK.

This report is a process evaluation of CASCADE programme experiences of the UK implementation sites. The report offers insights into the co-creation of the CASCADE model and the use of the newly established dementia care facilities before and during the COVID-19 pandemic as well as the delivery of services following the end of the pandemic interruption.

2. Methods of data collection

The initial protocol for evaluating CASCADE implementation at Harmony House and Harmonia Village was revised to not only contain the disruption but also to capture experiences and the contribution of the facilities during the pandemic. The revised protocol drew on Moore et al.'s (2015) process evaluation framework (Figure 1) to gather information about experiences of:

- Co-creating the CASCADE model
- CASCADE during the COVID-19 pandemic
- Implementing the CASCADE model

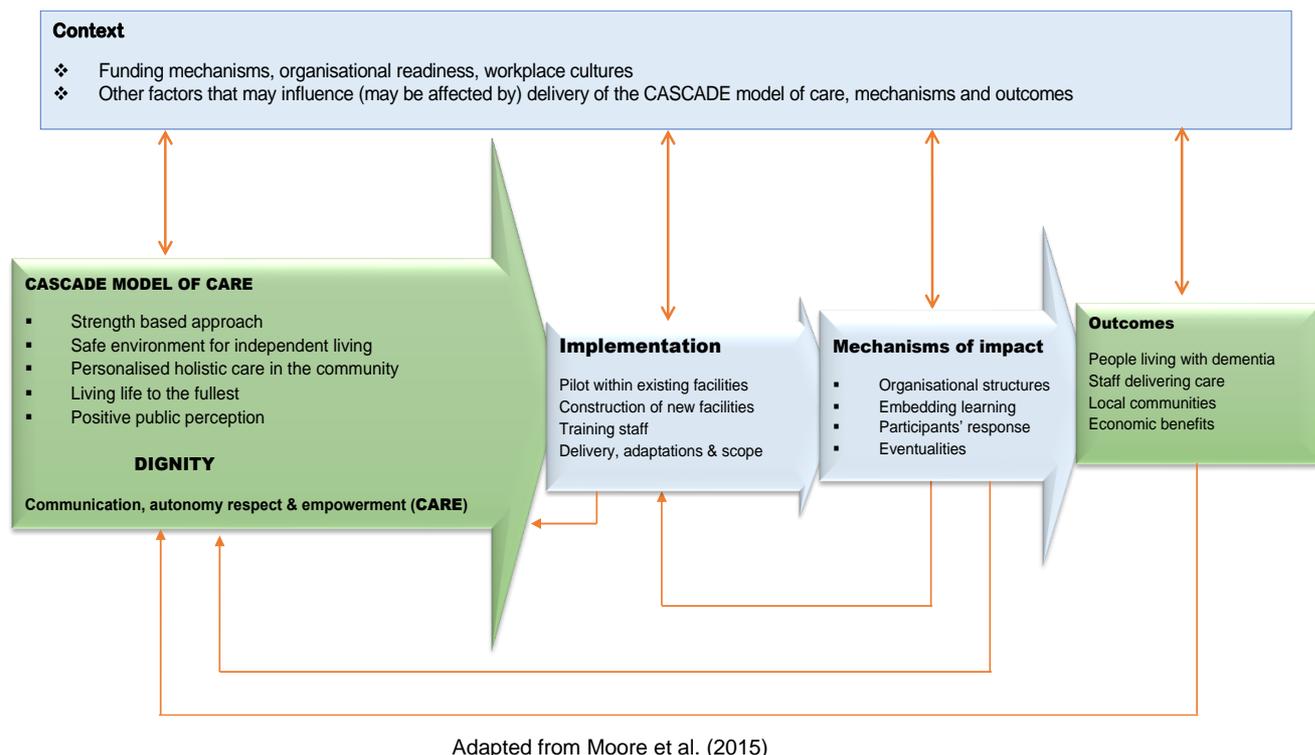


Figure 1. Process evaluation of the CASCADE programme in the UK implementation sites

Process evaluation data were collected through semi-structured interviews with project site representatives such as site leads, managers and staff as well as informal carers. Data about resident wellbeing and experiences was collected with the use of standardised questionnaires by-proxy through site staff. Also, training feedback was received via online surveys for staff attending the CASCADE training programme entitled *'You and Me, Together We are Human'*. Other data sources comprised secondary routine care data for residents provided by the implementation sites, including data from technology devices where available (e.g. Hawkinge House) as well as process evaluation data collected during the project.

2.1. The context of the UK CASCADE sites: Harmony House and Harmonia Village

The context can influence differences in outcomes as much as programme implementation may change the context (Moore et al., 2015). In this project, the context encompassed active and unique factors surrounding implementation of the CASCADE model including the physical setting and multi-layered relationships (Pfadenhauer et al., 2017).

Harmonia Village and Harmony House, the two UK facilities which were set up during this project, are located in the most deprived areas in Kent region¹. These sites are affiliated to East Kent Hospitals University NHS Foundation Trust (EKHUFT) and Medway Community Healthcare (MCH) respectively. EKHUFT, one of the largest hospital Trusts in England, constitutes five hospitals providing a range of emergency, elective and comprehensive services. MCH, a community-based healthcare provider, hosts a Dementia Crisis Support Service, which is fairly unusual for this type of organisation. While MCH sets out to provide improved standards of respite care, EKHUFT seeks to improve hospital patient flow through providing inclusive dementia care and support modelled on normalised small-scale living.

At the start of the project, initial visits to Hogeweyk Dementia Village in Holland and existent services run by CASCADE partners in Belgium and the Netherlands motivated the UK partners' enthusiasm for deinstitutionalised care for people living with dementia. However, the UK 's system of funding for long-term care varies from that of Belgium and the Netherlands. All citizens of Belgium and the Netherlands in employment make mandatory income-based contributions to long-term care. Social care in England is funded through local government revenue and the support for long-term residential care is not guaranteed (Dodsworth & Oung, 2023). Long-term residential care in England is means-tested, involving a review of the financial status of individuals including valuing property owned to determine if they qualify for local government support.

3. Co-creating the CASCADE model of care

The CASCADE model was created in collaboration with various stakeholders consulted on the different aspects of the model. The themes distinguished from experiences of co-creating the CASCADE model comprised identifying local needs, building the care facilities and raising dementia awareness.

3.1. Identifying local needs

Local needs were identified through gap and needs analyses employing online surveys, evening events and focus group discussions with a range of stakeholders. Focus groups (n=22)

¹ Ministry of Housing, Communities and Local Government (2019). Interactive Dashboard - <https://www.gov.uk/guidance/english-indices-of-deprivation-2019-mapping-resources> [Accessed 25/3/2023]

engaged people living with dementia, family carers, volunteers from charity groups and other stakeholders. Drop-in sessions held fortnightly spanning three months to talk about the Dementia Village were open to the public and health and care staff. The Dementia Crisis Support Service hosted by MCH supplemented information about the existing demand for respite in the region. Site representatives echoed:

We really tried our best to involve people and, as I say, we consulted the people living with dementia, their carers, relatives, and some of the clinical professionals that helped us with the design (Harmonia Village representative)

we had a number of evenings in this building adjacent to Harmony House. We sent invites out to all of the local residents to come and join us over a series of two or three nights ... you know offering tea and coffee and biscuits etc (Harmony House representative).

Stakeholder consultation events involved question and answer sessions about several topics ranging from misconceptions concerning caring for people living with dementia to the structure and appearance of the buildings. Minor considerations in the operation of the facilities such as time for deliveries were assured to accommodate the feedback from local residents. A survey exploring knowledge, attitudes and practices of using technology in dementia care engaged 64 participants most (44%) of whom were family carers. Participants from Belgium (n=34) and UK (n=37), most of whom were clinicians (62%), responded to the survey about needs and preferences of using technology for remote consultation. A range of options for resident monitoring and communication technology solutions were identified and the preferred systems installed (O 3.1 of Work Package 2).

Project representatives worked closely with local governments and other commissioning partners to raise awareness of the benefits of community integrated dementia care pathways. However, engaging these groups of stakeholders was a challenge despite their good knowledge of service needs informed by regular purchase contracts. One of the site representatives stated:

Well, we tried to involve them. We met with several groups ... In actual fact, they admitted they don't pay low fees because they have to buy in the spot market ... they

are very reluctant to commission. They don't want to commit funding if they don't have to.

CASCADE partners met regularly to collate information gathered from dementia care stakeholders and to share best practice all of which informed the CASCADE model.



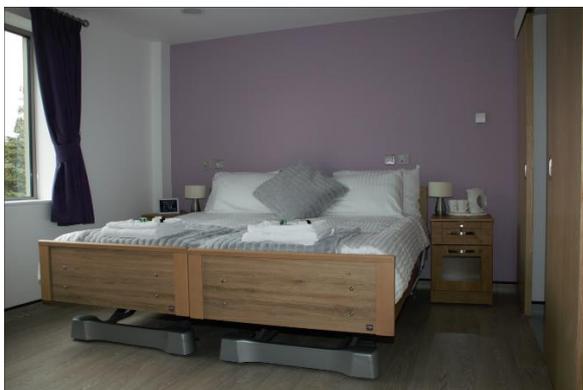
3.2. Building the dementia care facilities

The newly established builds and furnishings in the UK facilities were tailored to the needs of people living with dementia and the objective was to encourage their independence. Both facilities, located in residential areas, are surrounded by necessary amenities to model the notion of community integrated care. Stakeholder consultations yielded useful feedback which was incorporated into the structure and furnishings of the dementia care facilities. The Harmonia Village site representatives stated:

So, we got as much input as we could. And that did change some of our plans. For example, the colour pallets are much more muted than we would have used originally. Uhm, people said they didn't want it to look like a playschool, they wanted it to look like a house. We also brought on board some approaches we weren't even thinking of. For example, music was absolutely not part of our thinking but through the

stakeholders we now see music as integral to the sort of daily routine and model of care.

The décor was carefully selected in consultation with dementia expert teams. For example, mirrors selected for the rooms were reversible and could be turned into a wall hanging for people who do not like mirrors. Colours were carefully coordinated to reflect the comfort of a hotel tailored for a peaceful stay.



Describing some of the considerations informed by dementia experts, the Harmony House site representative said:

Everything was coordinated so it looked like a hotel room. We had clocks on the bedside table that were quite big in terms of the digits, so it was very easy to see the time. There was a soft light at night, so they could see the time if they woke up in the night. We had mirrors that were put on the walls in the rooms, that could be a mirror for people with dementia who are happy to look in a mirror. But again, taking advice

from our dementia experts, it could also be flipped around so that the mirror then just became a picture.

3.3. Raising dementia awareness

The Harmonia Village hub hosted a world café to improve dementia awareness in the communities surrounding the Village. The event attracted 46 participants who included people living with dementia, family carers and representatives from local businesses, community groups, charities and health and social care service providers. Several topics were discussed at the event encompassing understanding dementia, the needs of individuals as well as local resources and systems of support (see Figure 2).



Illustrated by Juli Dosad

Figure 2. Illustration of topics discussed on the World Café Day

Factsheets were distributed door to door in the local communities surrounding the sites to enhance the quality of interactions with people living with dementia. Local communities did not take part in the knowledge, attitude and practice survey because their understanding of the purpose of the dementia care facilities had changed since the initial community engagements. One of the site representatives said:

But during that COVID period, there wasn't a huge amount of engagement with the local residents, I would say because everybody was in lockdown... there wasn't really

any activity in terms of ongoing engagement... the client group kind of changed here. So, it wasn't just people with dementia that were coming in. It was people that had been in hospital that had COVID, that were recovering from COVID.



4. Implementing the CASCADE model prior to COVID-19 pandemic

Harmony House and Harmonia Village were both complete, staffed and had received Care Quality Commission (CQC) clearance towards the end of 2019. Harmonia Village reported a total of 81 expressions of interest from potential residents had the opening proceeded according to plan. Harmony House opened in October 2019 offering long weekend, short and full week respite packages for people living with dementia. All guests were self-funded and health commissioners showed interest in the building as a way of preventing unnecessary hospital admissions. Available data from Harmony House indicated that there were steadily growing a clientele base for respite care:

- 44 bookings were made for approximately 230 nights between November 2019 and March 2020.
- Five guests stayed at Harmony House more than once while the COVID-19 pandemic intercepted six bookings.
- Repeat service use was an indicator of a trusted service and MCH representatives were positive the custom would have grown much more if COVID had not interrupted

the service. Box 1 highlights some of the services and activities that were available for guests at Harmony House.

Box 1 Activities at Harmony House before COVID

We had lots of activities...we had a bookshelf with lots of different reading material or various genres. We had board games puzzles, we had DVDs, CDs for music, each of the rooms had a television. If people wanted to have a paper in the morning, then we could arrange that from the local Co-op [store]. We did as much as we could to make it look like a guesthouse or a hotel, but each guest was then assigned a personal assistant. We had examples where people wanted to go and visit Rochester cathedral, even if they hadn't been to the cathedral for a while, then we were able to support that. We had somebody that went to Priestfield, which is our local football stadium, people that went to the library...There's a whole range of different activities. We tried to make everything as accessible as possible, as safe as it could be. But without stifling the independence of the person coming in. [Harmony House site representative]

Clientele trust influences the loyalty of clients whereby satisfaction with a service inspires the clients' confidence in the service (Sirdeshmukh et al 2002) as the Harmony House site representative iterated:

We did have some really nice feedback from people that came to use the facilities. I think particularly where people came and then before they even left were booking another little break with us again. I think that spoke volumes... We had lots of positive comments from family members and carers that came in. They also felt very reassured that they were leaving their loved one in a place of safety.



4.1. Technology at Harmony House

Harmony House piloted using technology in dementia care between October 2019 and February 2020. However, the artificial intelligence systems set up to correlate information about observed changes in behaviour and health and develop predictive algorithms did not meet user expectations sufficiently. Staff feedback identified that the sensors did not work as expected to manage the risk of falls.



Staff reported a delay between reactivity from the sensors and activating the alert. Clip-on sensors originally located on mats placed under the chair cushion and or mattress were also ineffective as guests frequently removed them. While assistive technology can be useful, a trend of trial and error exists in dementia care particularly as the condition progresses, which raises cost-effectiveness concerns (Sriram et al., 2020).

5. CASCADE during the COVID-19 pandemic



Respective hospital affiliations took over the running of the dementia care facilities at the onset of the COVID-19 pandemic. Repurposing Harmonia Village and Harmony House to support the rapid hospital discharge initiative and cope with the increased demand for acute hospital beds was an unforeseen but a consequential pathway.

5.1. Harmony House

Harmony House was reported to have supported the care of several people during the COVID pandemic. Table 1 provides insights into the throughput for Harmony House between April 2020 and March 2022.

Table 1. *Harmony House utilisation between April 2020 and March 2022*

		N (%)
Referral from	Hospital	166 (91%)
	Home	8 (4%)
	Care home	4 (2%)
	Other	5 (3%)

Readmission	Yes	12 (7%)
Age group	25-44	3 (2%)
	45 - 64	26 (14%)
	65 -84	80 (44%)
	85+	74 (40%)
Dementia diagnosis	Yes	17 (9%)
Length of stay in days	<5- 15	43 (23%)
	16-45	69 (38%)
	46-85	56 (31%)
	86+	15 (8%)
Discharge destination	Hospital	47 (26%)
	Home	79 (43%)
	Care home	39 (21%)
	Other	15 (8%)

Essential changes were made to incorporate hospital like beds and infection control systems at the onset of the COVID-19 pandemic. Harmony House was converted into an 18 bedded intermediate care and rehabilitation unit. Reasons for admissions included rehabilitation needs, transit into residential care or supported home care and direct crisis referral from community nurses. The majority (91%) of admissions were from the hospital and patients could stay at Harmony House up to six weeks. People aged 65 and over comprised 84% of the total admissions during this period with an average length of stay of 47.8 days. A small proportion (9%) of the total admissions constituted people living with dementia. Most people (43%) were discharged back home and some back to the hospital (26%) with only 7% readmissions to Harmony House out of the total original stays (n=183). Although a reduction (23%) in emergency hospital readmissions was realised in England in the first full year of COVID-19 (2020/21), frailty and comorbidities in older adults were some of the causes for emergency readmissions (Nuffield Trust, 2022). The CASCADE model was reported to have influenced service delivery during the pandemic as the Harmony House site representative said:

We would always like to think we deliver care in compassionate way. And I think the way that it's been delivered in terms of that [CASCADE] model of care being really patient centred, around what their individual needs are, I think care is absolutely a testament to that value.

5.2. Harmonia Village

The Harmonia Village status report issued in January 2023 identified a total of 663 bed days made available at East Kent hospitals in 2020 during the first wave of the pandemic. However, staff employed to work at the Village were redeployed to support the Trust's increased hospital activity during the second wave of COVID. Local community groups were able to use the Village hub and continued to do so (Table 2). Box 2 includes feedback from people living with dementia on their experiences of the Bright Shadow Zest community group activities.

Table 2 *Community group activity attended by people living with dementia and their carers between 2021 and 2022*

Group	Purpose	2021 activity	2022 activity
Bright Shadow Zest	Creative opportunities for people living with dementia	26 workshops	35 workshops
Cogs club	Post dementia diagnosis community support	14 meetings	-

- 10 people living with dementia regularly attend Bright Shadow Zest creative group with three facilitators.
- 80% of participants are above 75 years and live in Dover.
- 78% of participants are female.
- Cogs club which offers support to people living with dementia and their carers after receiving a diagnosis was attended by 22 people in 2021.

Box 2. Feedback on the Bright Shadow Zest community group

Location

While the location was deemed ideal due to parking facilities, most participants (67%) reported that the hub was inaccessible without private transport arrangements. One of the group participants commented:

I couldn't come if I did not get a lift. I would prefer if it was in the town, and I would get a bus. Then I would be more independent (Person living with dementia).

Benefits of attending community groups

Community group participants mostly mentioned friendships, fun, socialising and the welcoming environment as the motivating factors for attending regularly. Similarly, companionship, enjoyment, feeling good and meeting with people were shared expressions of the benefits of attending the creative workshops.

Recommendations for improving experiences:

- diversifying group activities to include singing,
- improving bus services and
- possibly changing the location to improve access.



5.3. Staff experiences with CASCADE training

Harmony House and Harmonia Village staff who received training to deliver the CASCADE model participated in a narrative inquiry which explored their experiences of delivering care for older adults during the COVID-19 pandemic. The numerous difficulties experienced were mainly influenced by changes in operational systems (Martin & Hatzidimitriadou, 2022). Staff reported that working efficiently within systems of delivering a medical model of care required a great deal of effort as processes seemed convoluted and inflexible. Staff recounted the CASCADE ways of working as an approach promoting kindness, inclusion and being non-judgemental; and a way of caring for people living with dementia that encourages independence, emphasises wellbeing and makes a difference to people's lives. One of the staff members who had worked at Harmony House echoed:

[we] went above and beyond to create a great environment for our guests. Whatever they needed we provided...[we] would do specific shopping at local supermarkets, so the food experience was very personal.

Staff talked about the significant challenge they were faced with when asked to make the sudden move during the pandemic into roles they were not well prepared for, and the purported lack of support raised levels of stress and anxiety. Due to the ongoing pressures on the healthcare system in the UK during the pandemic, during this period, the future of resuming care delivery as per the CASCADE model seemed challenging as one staff member stated:

It has been very stressful to me. It is evident that other staff have been stressed across all bands which has displayed in various ways. The disappointment amongst staff that we are not able to work to the CASCADE model is evident in conversation with some staff stating that they will be looking for alternative employment if there is no end in sight to this way of working.

Over time, staff persisted with using principles of the CASCADE approach to dementia care, which they reported were beneficial to service users. Residents seemed happy most of the time, felt safe and emotionally supported especially in the absence of physical contact with families. A staff member reiterated:

We are using our skills and the strong personal feelings that made us want to work [here] to make sure each resident is benefitting from individual assessments to meet their needs. Activities have been planned around their individual likes and dislikes within the boundaries of functioning in lockdown and social isolation and these have been supported and been inclusive, even when the patient is in the first 14 days of isolation.

The resilience portrayed by frontline staff during the COVID-19 pandemic gradually connected health and care teams via mutual encouragement through common experiences. The COVID-19 pandemic offered valuable insights for the CASCADE ways of working that staff willed to incorporate into future practice. Indeed, the current demand at Harmony House has shifted to more step-up step-down care, which has far exceeded the demand for respite care, post pandemic.

6. Implementing the CASCADE model after the COVID-19 pandemic



Both UK CASCADE delivery sites were significantly impacted by the COVID-19 government policies on delivering health and social care and the national repurposing on care facilities to priority areas of the healthcare service provision. In June 2022, the UK government announced the end of these policies, however the health care system continued to experience significant difficulties in delivering services ‘as usual’ during the remaining of 2022 and 2023 (Daley et al, 2022; Reed, Schlepper & Edwards, 2022; Curry et al, 2023).

6.1. Harmony House

In June 2022, in Harmony House, 19 staff were trained to deliver the CASCADE model of care, in preparation to resuming their respite care services in the new facility.

Box 3 includes a summary of staff feedback on the CASCADE training programme entitled ‘*You and Me Together we are Human*’. Staff feedback on the CASCADE training was very positive and indicative of the model’s capacity to change dementia care practice to a more person-

centred care delivery. Data collected from three residents who used the facility during that period of resuming services, could not be analysed as it was incomplete. MCH continue to respond to the need for step-up step-down care at Harmony House which far exceeds the demand for respite care.

Box 3. Staff training at Harmony House

- 94% had cared for people living with dementia before undertaking the training.
- All participants agreed the course was relevant and that it made them think about their usual ways of working.
- 88% of participants reported to have gained confidence in providing dementia care.

Recommendations:

- Add activities to make the training sessions fun.
- Include practical advice or tools for dealing with challenging behaviour.
- Allocate more time to the course for participants to explore areas they wish to know about.
- Make the course widely available for those who want to undertake the training.

6.2. Hawkinge House

Due to the COVID-19 delays in implementing the CASCADE model of care in Harmonia Village, EKHUFT introduced the model of care and technologies at another care home facility locally, Hawkinge House, in January 2023.

Hawkinge House is a nursing home with residential care and has a building capacity of 180 beds with 62 beds dedicated to short-term and long-term dementia care. There are three buildings on the new estate in which Hawkinge House connects with a Digital Innovation Centre and a Proactive Assessment Unit. The House is surrounded by greenland and parks, and the entirety of the dementia care building has recently been refurbished and residents, family and friends have access to the 'village' on the second floor of the building which includes a pub, sweet shop, hairdressers, and art studio, landscape gardens are at the rear of the building. There is also a gym available to residents, with exercise plans facilitated by an occupational therapist. The health care provided at this facility is funded through the NHS and also includes some private residents, primarily from the local authority of Kent, who have

been identified through risk assessments as needing 24-hour care, many of which are between 49-100 years old. The range of dementia diagnosis differs across residents from early onset, needing some supervision and encouragement, walking, non-verbal requiring the use of flashcards, to later stages needing assistance in wheelchairs, hoisting, or being nursed in their beds.



Gardens at Hawkinge House ([Gallery - Hawkinge House Nursing Home and Care Suites Kent](#))

6.2.2. Methods

As part of evaluation of the implementation of the CASCADE model of care, four staff members at Hawkinge House were interviewed including: the deputy care home manager, the registered manager (Short Term Care), and two professional carers. Also, an informal carer/family member was interviewed to capture feedback about the experiences from their perspective.

Semi-structured interviews took place in June 2023. Staff interviews focussed on training in the CASCADE model of care², experiences of implementing the CASCADE model, benefits and challenges of using technology and residents' experiences. The informal carer interview centred on the experiences of their relative/cared for person and if they had any noticeable differences in care provided in the CASCADE model as implemented at Hawkinge House, compared to other providers they may have experienced.

² Staff Trained in the CASCADE model also referred to it as Person Centred Care (PCC) model.

Quantitative feedback regarding staff experiences of implementation of CASCADE training was collected via online surveys and forms. Also, the experiences of residents who were being cared for by staff trained in the CASCADE model of care were also captured through staff completing by-proxy online surveys covering:

- Referral Form (*Dementia Diagnosis, Gender, Ethnicity, Medication, and visits to GPs and other professionals*)
- Telehealth (*Interactions with technology*)
- Care Quality and Safety Indicators (*Falls, Medication errors and Behaviour Events*)
- Health Status - EQ-5D-5L Proxy Version (*Behaviour, Mobility, Anxiety levels*)

6.2.2. Staff and Residents Profile

Staff had a variety of experiences working in health care settings (range = 18 months to 15 years) and working in their current role (range = 1-10 years).

Of the 10 residents, for whom information was collected by-proxy via staff, 8 were women and 2 men, most of them white English, with diagnosis of dementia, predominately Alzheimer’s (Table 3). Most residents had moderate to severe problems walking, with 3 being unable to walk (Figure 3).

Table 3: Demographics of CASCADE Residents at Hawkinge House (n=10)

Gender	Female	8 (80%)
	Male	2 (20%)
Ethnicity	Mixed or multiple ethnic groups	1 (10%)
	White English	9 (90%)
Dementia diagnosis	Alzheimer’s	6 (60%)
	Alcohol Induced Dementia	1 (10%)
	Vascular Dementia	1 (10%)
	Mixed Dementia	1 (10%)
	Non-Diagnosed	1 (10%)

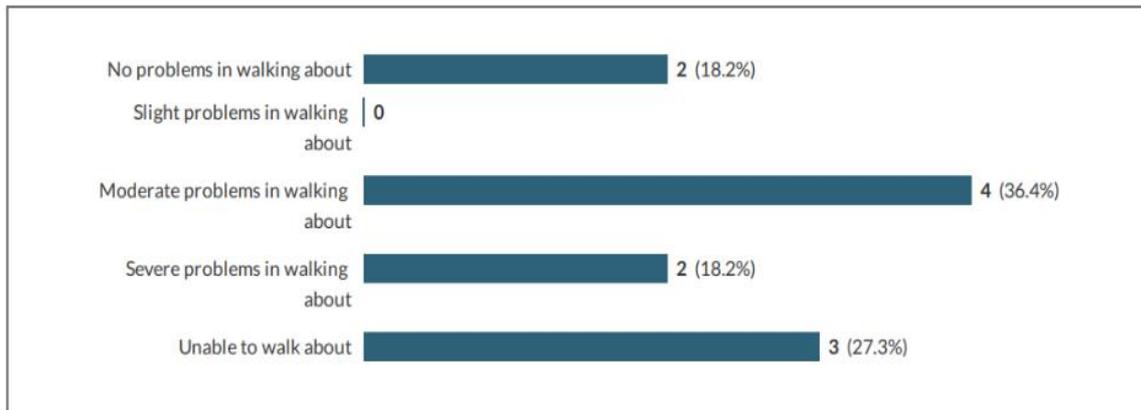


Figure 3: *Hawkinge House Residents' levels of mobility – EQ-5D-3L by proxy*

When residents were referred to the facility, staff were undertaking holistic initial risk assessments, in line with the CASCADE model, to support communication of standards and realistic expectations of residents' care. An initial needs assessment and care plan was drawn to assist staff in knowing about the person before their dementia diagnosis; for example, their routines, likes and triggers for feeling challenged. This initial assessment, prior to residents coming to Hawkinge House, facilitated an understanding between the families, residents, and staff of the needs of the residents, including the need of purchasing particular equipment before they were in situ, putting residents' needs at the core of the care plan. The staff team stressed the importance of engaging with families particularly when the resident was non-verbal in their initial assessment; where family were not involved, assessments were made on the basis of their medical and care recorded history. The CASCADE model of care aided staff to develop customised care plans for each resident that has been '*noticeable by family and staff in care practices*'. According to staff feedback, the environment of '*open two-way discussion and feedback*' with staff, families, and residents has also been evident in the reduction of complaints received during the period the CASCADE model of care was implemented. The family member who was interviewed also noted they had '*dreadful*' experiences of other care homes but experienced a notable change in coming to Hawkinge House, which has been '*super*' and reiterated the open communication between families and staff, supporting swift resolutions to any concerns the family member might had. Initial conversations with families, although challenging to start with, particularly with those from a '*non-care or medical background*' were similarly supported by implementing the CASCADE model, with realistic expectations of care being discussed openly, with the resident at the

forefront. Staff noted that 'red tape' around some processes could also be challenging in providing the right type of care and commented that when a process was risk-assessed and the resident was at the centre of the decision, then these challenges could be overcome.

Residents and families were encouraged to personalise residents' rooms, with favourite photographs and bedding, to make it more homely and familiar for residents, as the informal carer highlighted in their interview:

they just let us, if you'd like a way of putting it up, just let us do what we want to do and everything like that. like the room. We redecorated it, put new furniture in, just looks home from home ...



Typical Room in Hawkinge House ([Gallery - Hawkinge House Nursing Home and Care Suites Kent](#))

6.2.3. Staff Training in the CASCADE Model of Care

Staff at Hawkinge House had an extensive programme of mandatory training for dementia, including the training using the latest technologies in dementia care such as Mii-Care, Atlas, MCM Device and Air Tags through the Digital Innovation Centre. Staff agreed that the CASCADE training and the training on technologies had been good; they were consistently engaged with the CASCADE content and activities as part of their role.

Feedback received through the *Staff Training Reactions Survey* indicated that the CASCADE training modules were well organised and followed the learning aims and objects well with responses ranging from 'agree to strongly agree'.

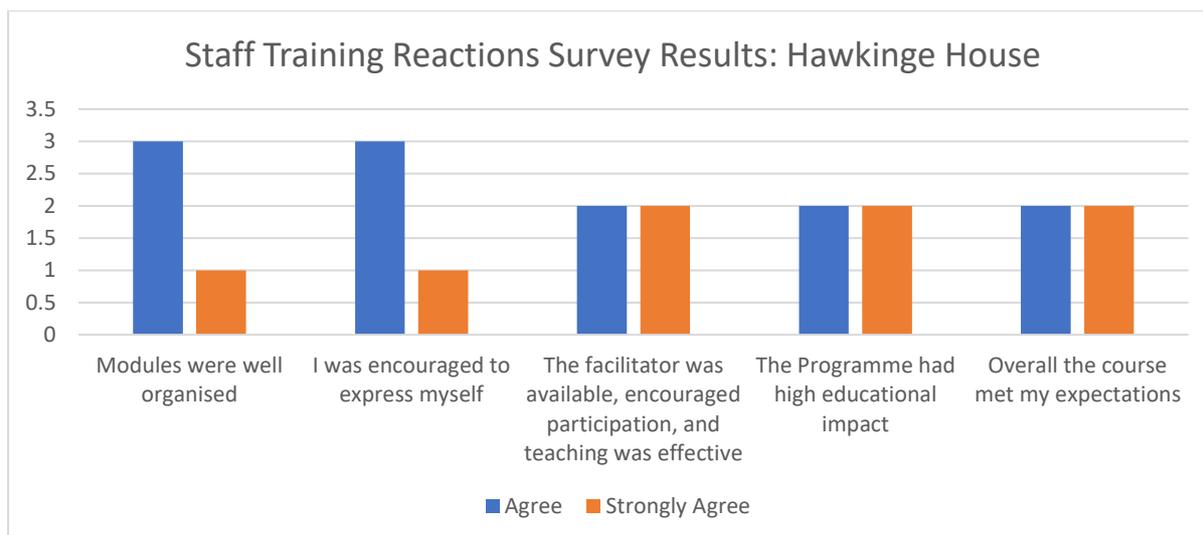


Figure 4: Staff Training Reactions Survey feedback – Hawkinge House

In addition to training modules’ feedback, staff agreed that workload for training modules was deemed appropriate, the assigned reading was valuable, and staff felt they were encouraged to express opinions. The facilitation of the training was scored very positively, including the facilitator's preparation, delivery, availability, and feedback. Specifically, staff reported that the facilitator was stimulating and interested in the subject matter, teaching methods were effective and actively encouraged individual participation, and staff were treated with respect. Overall, staff felt that the facilitator presented the material in a clear manner that facilitated understanding with 3 out of 4 responses noting ‘*strongly agree*’. 1 out of 4 staff surveyed completed some of the *Staff Training Reactions Survey* and ‘*agreed*’ that the platform was updated and accurate, teaching methods effective, and aided their learning. Overall, the CASCADE training activities and projects measured surveyed staff knowledge and course material, and the course was relevant. The training course was agreed as being challenging, with one staff member noting ‘*uncertain*’, overall staff felt that the course was relevant, made them think, and felt confident in the knowledge and understanding of the actions of the 5 CASCADE principles. Staff noted in the free text question, the strengths of the programme as it ‘*helps new carers, provides more access to the community, and gives care to residents with more value and help their self-esteem*’. Staff felt overall that the programme had high educational impact, stimulated their interest, met their expectations and they would recommend the programme to others.



Increased care to Residents at Hawkinge House ([Gallery - Hawkinge House Nursing Home and Care Suites Kent](#))

Survey feedback from staff on the implementation of the CASCADE training was overall positive with respondents confirming that they could see how this model of care differed from their usual ways of working, could see the potential value of this model for their own practice and were keen to use the learning from the training with support from their manager.

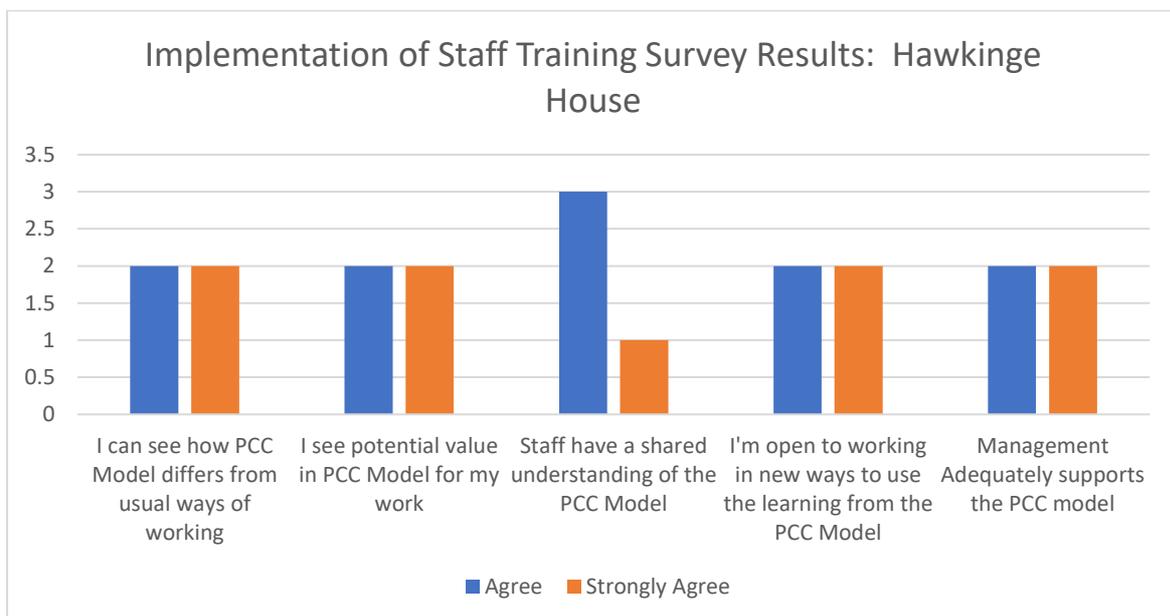


Figure 5: Implementation of CASCADE staff training – survey results from Hawkinge House

Further staff survey results on the implementation of the training confirmed that residents' life history was formally used in their care plans, however there was an emphasis on staff-resident interaction over completion of such tasks. As per Figure 5, staff agreed that they had a shared understanding of CASCADE, how it affected positively their practice and they could

see the value of the openness in the CASCADE model which they were keen to continue to implementing in their care practice.

Staff felt that their training was easily transferable to their existing work and were confident in that work was assigned to their skills sets. Sufficient training and resources were provided to support the CASCADE model and this was also reiterated in the feedback from the semi-structured interviews. Staff felt that the CASCADE learning was worthwhile, and valued the effect it had on staff working practices. In the spirit and ethos of two-way communication and feedback, staff felt able to feedback on the training, and were confident that any suggestions would be used to improve the training in the future.

Hawkinge House management, its staff and the Digital Innovation Centre technologies team were committed to embracing digital innovations and solutions as part of CASCADE model of care. The Digital Innovation Centre at Hawkinge House not only provides staff training in digital technologies but also opens training to the wider community and Trusts. Face-to-face training is actively encouraged as well as online training and webinars. Staff are encouraged to suggest technology solutions that maybe relevant to the residents they are working with and attend additional training as required.

6.2.4. Technologies at Hawkinge House

According to the interviewees, a variety of technologies were used within the Hawkinge House such as:

- Mii-Care (Sensor cubes and CCTV in residents' rooms)
- MCM device (handheld device)
- Atlas (medication administration)
- Oomph! Activities Platform (to record residents likes and dislikes)
- Staff Air tags (to monitor staff locations)
- Smart Watches (wearable technology for residents)

Interviewed staff noted that a range of devices supported them in technology-based active care and monitoring of residents, which had removed any unnecessary interventions during the night such as pad checks and repositioning by staff, resulting in residents having more restful sleep due to less intrusions. Sensor monitoring had enabled staff to have more time to provide quality care, evidenced by examples such as hand-held devices used by staff to

record residents' experiences through the 'icons' interface. Staff reported ease of recording allowed more active time 'such as comforting and handholding' with residents rather than completing paperwork. The use of technologies and subsequent more quality care time with residents could be a possible reason for the declining number of resident falls, as evidenced by the Care Quality and Safety Indicators (CQSI) survey. Results indicate a decline in falls, with only 2 (out of 10) CASCADE residents having falls between April and June 2023, while there were no reported falls for the remaining 8 reporting (Figure 6).

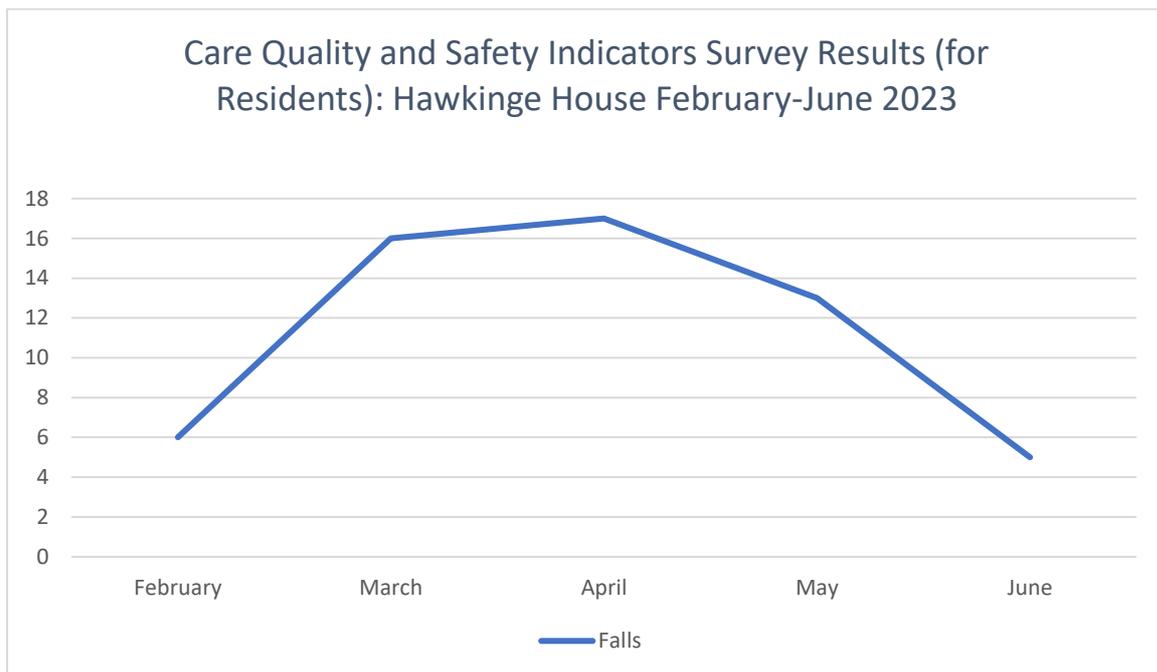


Figure 6: Reported residents' falls at Hawkinge House – February-June 2023

Staff also reported that technology enabled more effective recording of residents' state of health, through hand-held devices. For example, wounds could be photographed and attached to residents' profiles for medical staff to assess. Similarly, staff noted the importance of technologies (barcode scanning) in reporting medication administration, which reduced the risk of medication errors, as was evident in no medication errors being reported in the period February-June 2023 via the CQSI survey.

Survey results were inconclusive regarding the frequency of behavioural events during the evaluation period February-June 2023. This analysis could be complemented by more detailed information by resident to understand more fully the variation in this area.

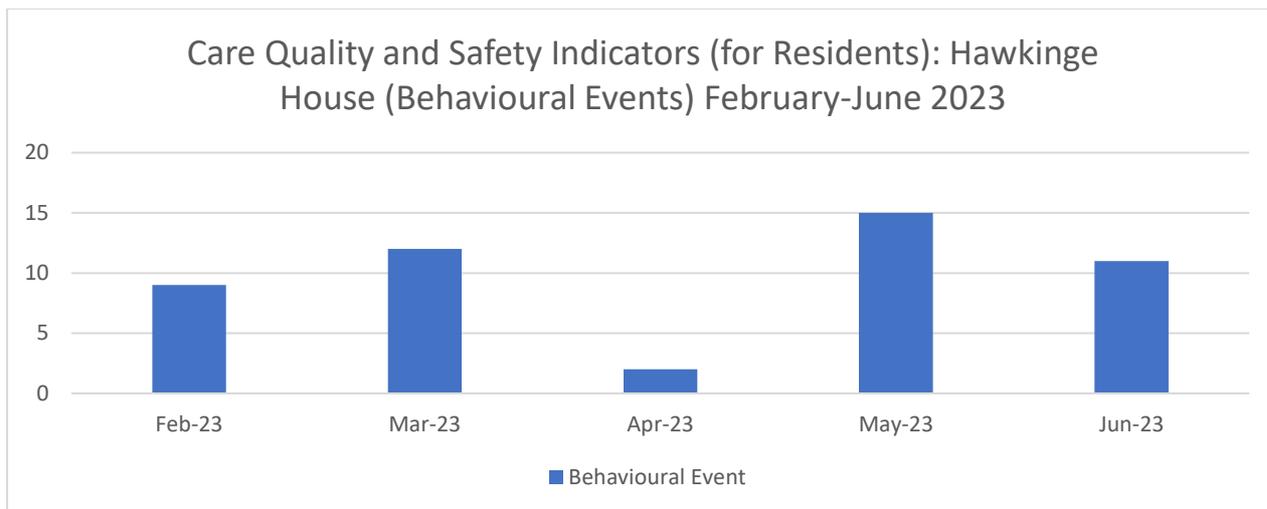


Figure 7: Reported residents’ behavioural events - Hawkinge House – February-June 2023

By-proxy feedback on residents’ wellbeing indicated that most residents were ‘not anxious or depressed’ to ‘moderately anxious or depressed’ only one resident reported as ‘severely anxious or depressed’ as indicated in the chart below. There was no opportunity to complete a pre or post evaluation of the EQ-5D-5L behaviours of residents.

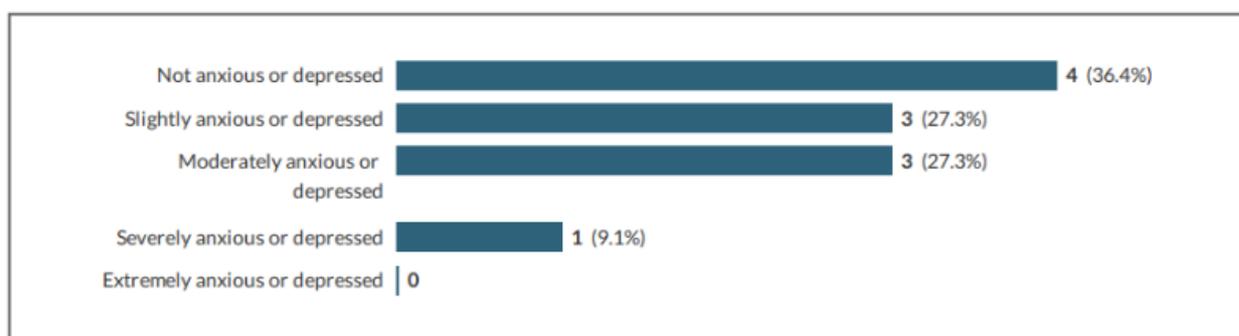


Figure 8: Reported residents’ mental wellbeing (EQ-5D-5L Proxy Version - Question 6)

Feedback from the informal carer confirmed findings on wellbeing as they noticed positive changes in their family member’s wellbeing:

[Family Member/Resident] has put on over a stone ... well, that must be contentment ... Well, if [Family Member/Resident] wasn't happy they wouldn't put the weight, wouldn't eat their grub and all that sort of thing, this is heaven for us, because we've got no worries.

Monitoring of residents through wearable devices had also given them greater freedom, enabling them to visit the gardens on the site (all secure and enclosed) again enabling ‘active

monitoring of residents by staff. There were some challenges noted by staff and family carer in using wearable technologies, where residents did not wish to wear them, have *'actively hidden them in the bin'* and/or they run out of battery:

[Family Member/Resident] *wears a watch now and again. And when it stopped, hasn't had to watch out for over a week. Now not often gonna say it wants charging, they should keep up on top of it, charge it and then give it back to [Family Member/Resident] ... it's a minor thing. It's not a bother really because there's a camera in the room anyway.*



TV in Rooms at Hawkinge House ([Gallery - Hawkinge House Nursing Home and Care Suites Kent](#))

Staff and family carer feedback highlighted that families were reassured by the monitoring of residents through the technologies, reflected in the use of multiple technologies supporting Hawkinge House communications. The use of technologies with the consent of residents and families, provided the ability to share data with other healthcare professionals, enabling a holistic monitoring of residents in such areas as medication reviews and identifying trends in residents' health. Families also have access to feedback from the technology systems, so can view their family members records online supporting communication and monitoring particularly when they are unable to visit Hawkinge House.

Staff noted challenges with using the technologies, in particular systems or WIFI fails being the core challenge. Data storage in Cloud servers is used for backup on such occasions.

Hawkinge House are continuing to embrace technology to remove any unnecessary tasks from staff. Staff were willing to suggest technologies that may support the rounded development and implementation of CASCADE. Staff were confident with the pace of development in terms of introduction of care technologies, with some aspirations of having future technologies that support those residents who are non-verbal, and the development of the TV systems where residents could pick their own food choices (which is currently facilitated by staff and family members), activities, and providing residents with reminders of the date, and appointments such as the hairdressers.



Salon at Hawkinge House ([Gallery - Hawkinge House Nursing Home and Care Suites Kent](#))

6.2.6. Understanding data from monitoring devices at Hawkinge House

Hawkinge House was instrumented with a range of sensing and monitoring devices with data capture for activities, environment conditions, and physiological measurements of the residents. The range of devices used are illustrated in the image below (Summoogum & Das, 2023).



Table 4 presents monitoring and sensor data provided by MiiCare (the technology provider for the facility) for 11 locations (rooms) where smart devices were installed. Data was provided in MS Excel file format and the table presents for each data file received the type of sensor indicated, the minimum and maximum values reported in the data files and the start and end dates for the capture of data. It also shows an estimate of the corresponding measurement frequency for each one of the different metrics recorded (sources: Digital Biomarkers, MiiCortex 2023; MiiCare Data Catalogue).

Table 4. *Monitoring and sensor data for CASCADE residents at Hawkinge House*

File name	Type of data	Range		Timeframe		Measurement Frequency
		Lowest value	Highest Value	Start Date	End Date	
BLE Sensor_values				15/02/23	10/07/23	2-8 min interval
	Beacon Sensor_value	0	100	08/03/23	10/07/23	2-8 min interval
	Wearable Sensor_Value	0	8781	15/02/23	11/06/23	2-8 min interval
	Hydration Sensor_Value	0	0	15/02/23	11/06/23	2-8 min interval
	Oximeter Sensor_Value	31	117	15/02/23	10/07/23	2-8 min interval
Sleep_scores				26/02/23	20/05/23	per night
	pred_wake_up	01:32.0	00:57:36	26/02/23	20/05/23	per night

	pred_wake_up_time_float	4.6447	10.3605	26/02/23	20/05/23	per night
	pred_sleepin	01:27.0	58:25.0	26/02/23	20/05/23	per night
	pred_sleepin_time_float	19.0241	25.3530	26/02/23	20/05/23	per night
	major	0	16	26/02/23	20/05/23	per night
	minor	0	3	26/02/23	20/05/23	per night
	time_awake	0	3.3432	26/02/23	20/05/23	per night
	time_asleep	5.5022	14.5175	26/02/23	20/05/23	per night
	efficiency	0.8621	1	26/02/23	20/05/23	per night
	time_actually_asleep	5.4153	13.9975	26/02/23	20/05/23	per night
	wake_up_consistency	-1.0862	14.9368	26/02/23	20/05/23	per night
	sleep_in_consistency	-10.8055		26/02/23	20/05/23	per night
	consistency_score	0.05335	99.9915	26/02/23	20/05/23	per night
	restfulness_score	0.1002	1	26/02/23	20/05/23	per night
	total_time_asleep_score	0.1247	0.9984	26/02/23	20/05/23	per night
Bathroom_Visits				09/04/23	11/07/23	per visit
	duration_in_seconds	0	8577	09/04/23	11/07/23	per visit
	bathroom_triggers	1	7	09/04/23	11/07/23	per visit
	entry_timestamp	00:02.0	59:54.0	09/04/23	11/07/23	per visit
	time	00:02.0	59:54.0	09/04/23	11/07/23	per visit
	exit_timestamp	00:00.0	59:54.0	09/04/23	11/07/23	per visit
Wellness_scores				23/02/23	11/07/23	per night
	physical_activity_score	0	100	23/02/23	11/07/23	per night
	adl_score	0	100	23/02/23	11/07/23	per night
	sleep_score	0	84.6677	23/02/23	11/07/23	per night
	vitals_score	0	0	23/02/23	11/07/23	per night
Zigbee_Sensor_Data	humi	13.53	75.93	16/02/23	24/06/23	30 sec interval
	temp	20.68	30.71	16/02/23	24/06/23	30 sec interval
	illum	0	32039	16/02/23	24/06/23	30 sec interval
	motion	0	1	16/02/23	24/06/23	per signal trigger

	door	0	1	16/02/23	24/06/23	per room transition
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An initial assessment was performed with provided data to establish possible measurements and metrics (i.e., values reported as scores calculated from other measurements using an undisclosed algorithm) which would be meaningful to illustrate in plots the condition, quality of daily activity and environmental conditions for the residents where smart devices were installed.

In this section, we illustrate areas of captured data in time plots including all the data available for the evaluation period. It should be noted that in many cases we observed: a) significant number of NULL values which might indicate missing values, or device malfunction, or inappropriate use of the device, b) significant number of values at the maximum of the corresponding range which might indicate device malfunction, or erroneous calculation in the presence of missing values, c) significant number of outliers which might indicate device malfunction, or inappropriate use. These observations agree with qualitative feedback received by staff and family carer who commented on the use of technology at Hawkinge House. For clarity, data could not be matched to the residents' information we collected by-proxy from staff as it was anonymous for GDPR reasons, therefore when referencing resident examples, code names are used.

The main aim of this analysis was to provide an understanding how monitoring devices data could be further examined to provide further insight into residents' composite indicators such as wellness, restfulness and movement within the facility. As discussed previously, staff and family carer feedback highlighted the value of active monitoring as an integral part of the CASCADE model of care therefore the potential of making effective use of the monitoring data is presented.

Wellness Scores

Information related to wellness indicators were generated by data captured through various sensors and wearable devices, covering Activities of Daily Living (ADL), physical activity and sleep scores. Analysis is presented for the 11 CASCADE resident rooms where devices were installed and examples of residents with low and high scores are used to demonstrate how

staff would be monitoring behavioural, environmental, and related factors impacting on residents' care.

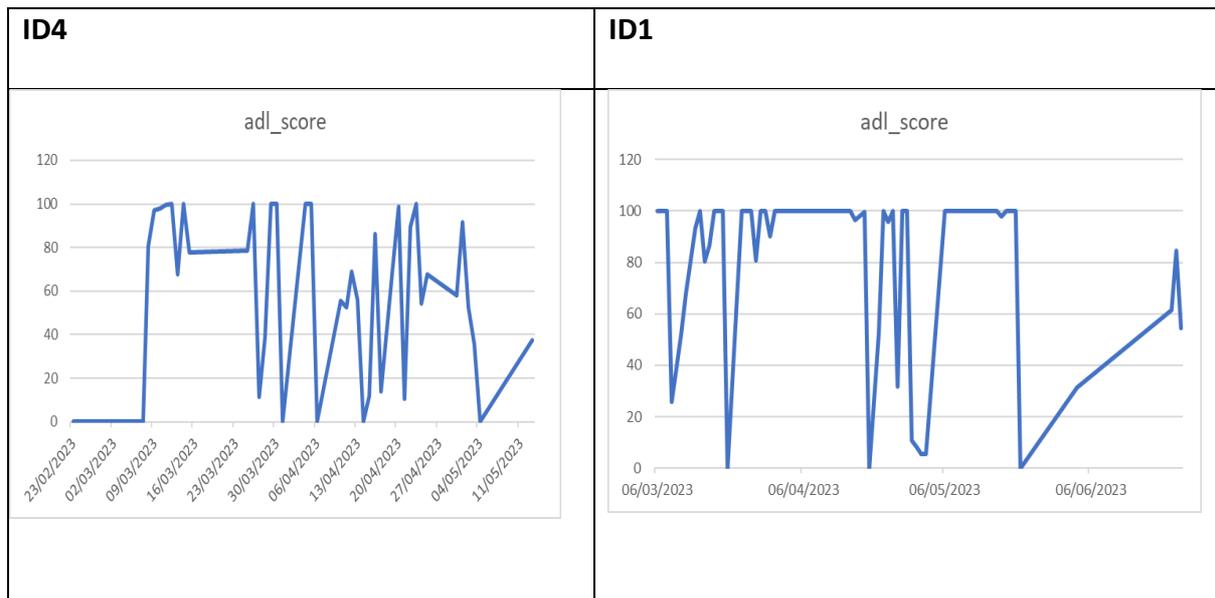
Activities of Daily Living (ADL) Scores



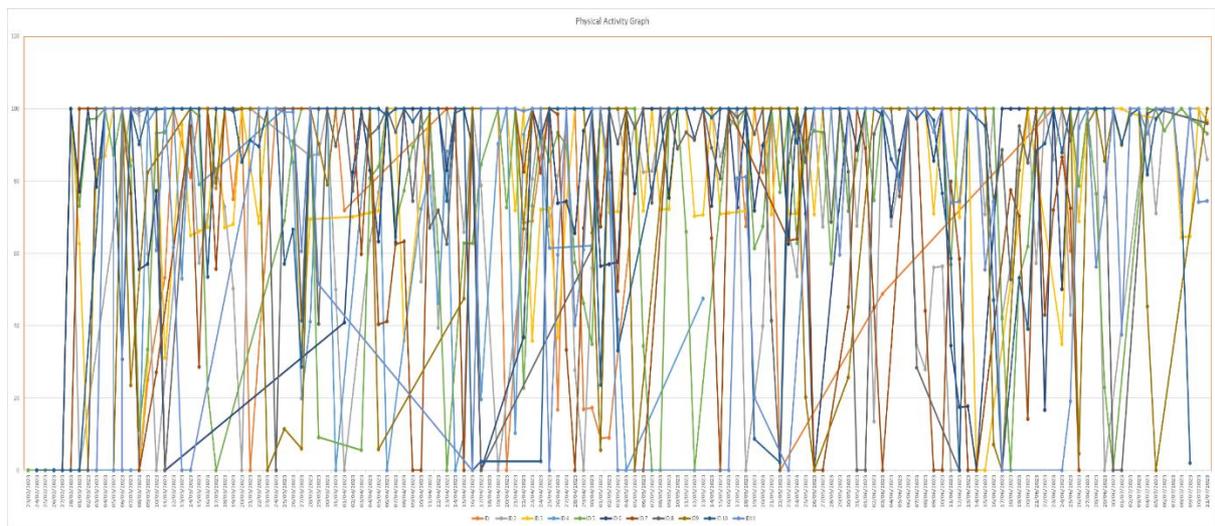
	ID1	ID2	ID3	ID4	ID5	ID6	ID7	ID8	ID9	ID10	ID11
Mean	78.792	66.3566	63.708851	58.64486	65.41275	76.1577	66.55	68.50670	77.357	74.0201	67.9126
N	56	114	119	42	120	95	92	111	98	113	85
Std. Deviation	34.235	33.6056	25.861530	37.83509	32.94978	28.6402	39.39	31.46064	34.117	33.9133	34.5788

Figure 9. *Activities of Daily Living (ADL) scores – Hawkinge House*

Figure 9 displays the activities of daily living (ADL) scores for all CASCADE residents. The ADL score is a weighted metric to assess the individuals' competency with regards to their daily routine. We selected to plot below separately the ADL scores for the residents with lowest and highest mean to explore any systematic variation in the range of the score values. Resident ID4 displayed the lowest mean ADL score indicating that they may have greater difficulties with daily tasks, may have greater deviations from their daily routine and more irregular bathroom and kitchen usage patterns. Comparatively, Resident ID1 presented with the highest mean ADL score, implying that they may have less deviation with regards to their daily routine, bathroom and kitchen usage patterns and had spent greater time performing their daily tasks.



Physical Activity Scores

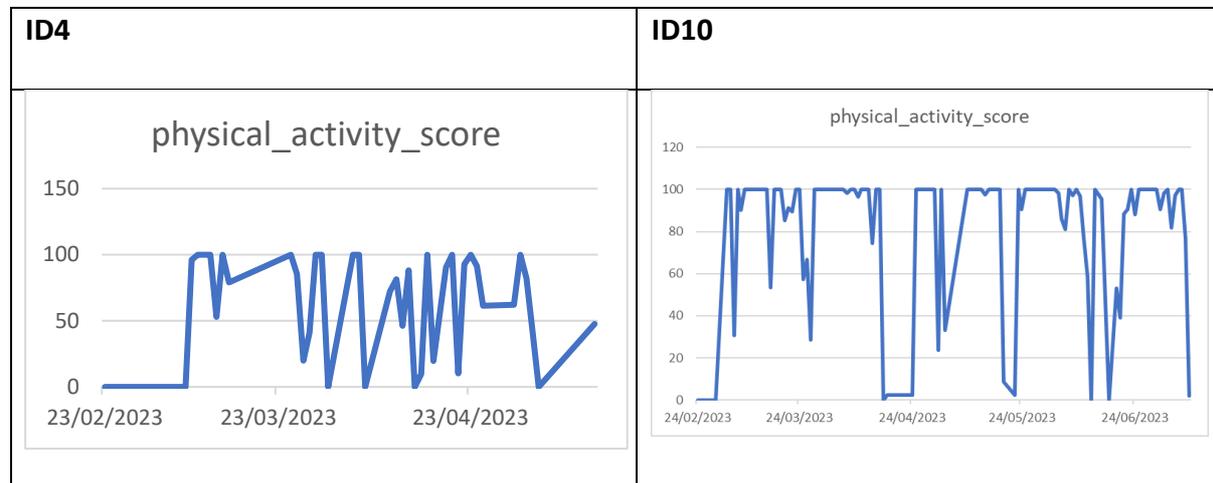


	ID_1	ID_2	ID_3	ID_4	ID_5	ID_6	ID_7	ID_8	ID9	ID_10	ID_11
Mean	73.87	71.750	79.957	61.233	74.7382	81.184	64.34	80.17	82.9	81.080	75.80
N	56	114	119	42	120	95	92	111	98	113	85
Std. Deviation	37.35	34.573	27.406	40.140	33.6580	28.345	40.08	33.76	33.8	33.486	34.97

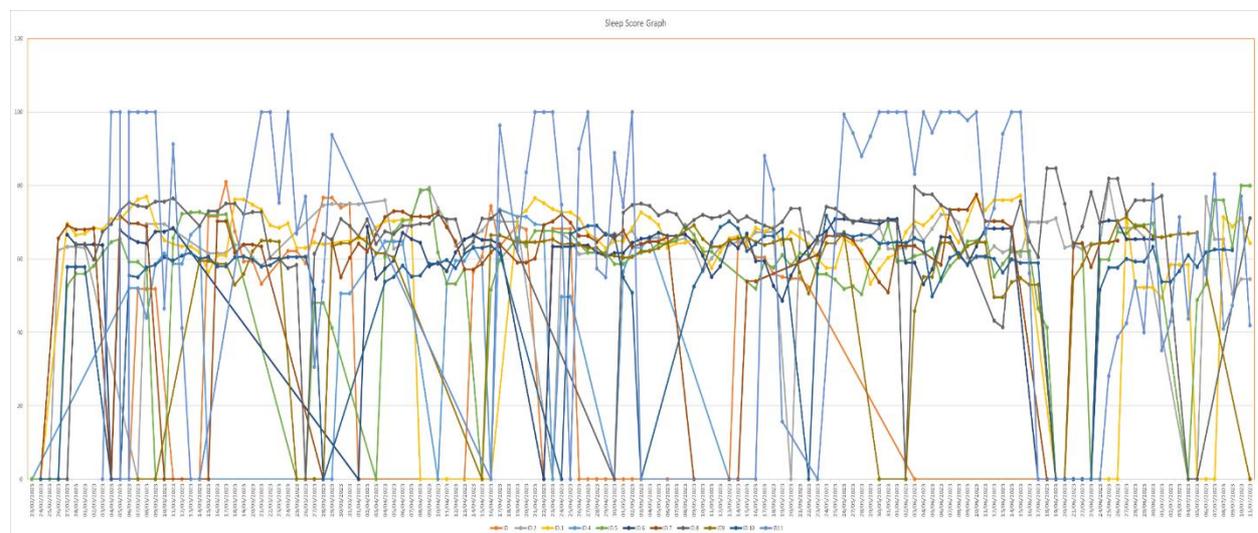
Figure 10. Physical Activity scores – Hawking House

Figure 10 displays the physical activity scores for CASCADE residents. The physical activity score is a weighted metric to assess the individuals’ activity levels, step count and room transitions. Resident ID4 displayed the lowest mean physical activity score implying that they

might be experiencing greater difficulties with remaining physically active than the other individuals. Resident ID10 had the highest mean physical activity score suggesting that they had higher activity levels, made greater room transitions in shorter timeframes or had greater step counts than the other residents.



Sleep Scores

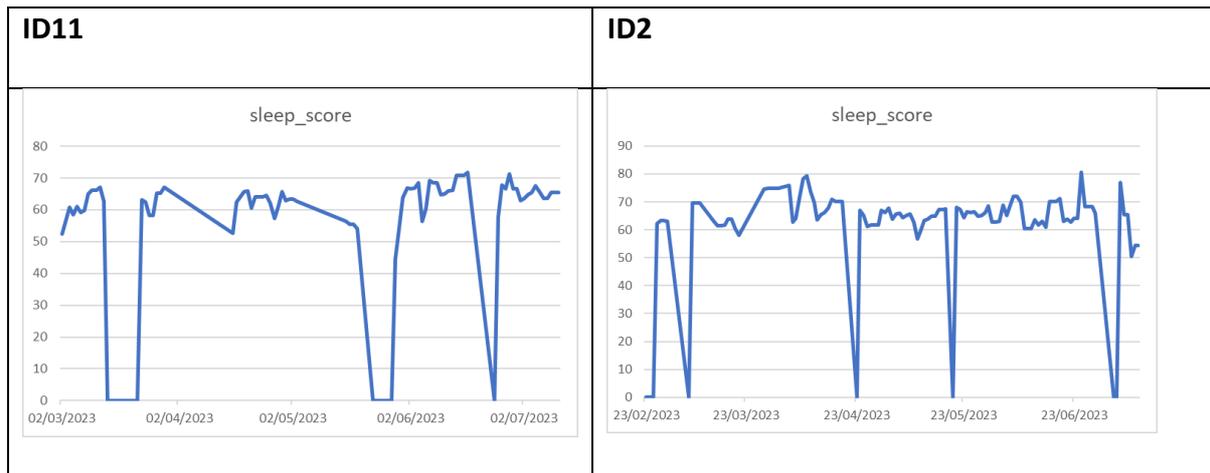


	ID_1	ID_2	ID_3	ID_4	ID_5	ID_6	ID_7	ID_8	ID_9	ID_10	ID_11
Mean	40.91182	61.4297716	59.5563760	43.19104	54.768885	57.0463541	57.034148	65.9304450	53.989375	53.675612	67.9126
N	56	114	119	42	120	95	92	111	98	113	85
Std. Deviation	31.45967	17.6552361	21.7449527	28.39157	21.230387	20.1417856	22.764821	18.3211945	21.726738	19.915325	34.5788

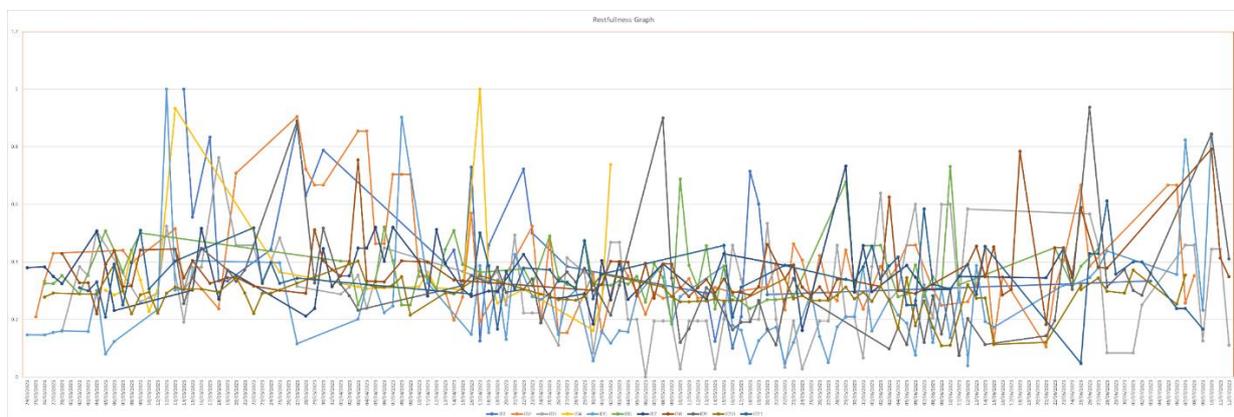
Figure 11. Sleep scores – Hawkinge House

Figure 11 presents resident sleep scores. The sleep score is a weighted metric to assess the individuals' sleep duration, quality, and disturbances. Resident ID11 displayed the highest

mean sleep score indicating a higher quality and duration of sleep, however they also presented with the highest standard deviation which reveals that the quality and duration of their sleep fluctuates significantly more than the other residents. Resident ID2 presented a similarly high sleep score however the low standard deviation reveals that this resident consistently experienced higher quality sleep in comparison to Resident ID11 and other residents.



Restfulness Scores

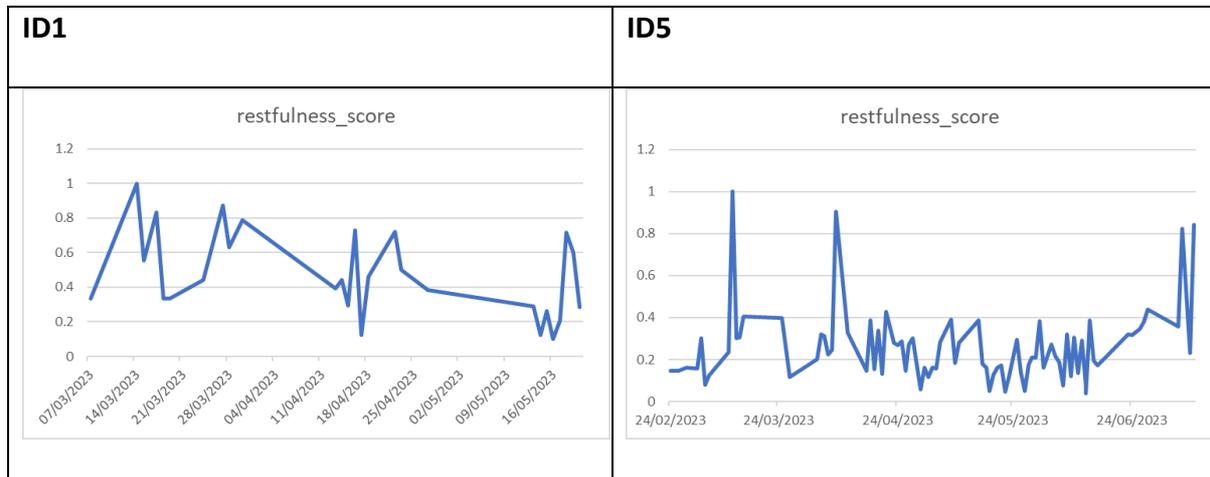


	ID1	ID2	ID3	ID4	ID5	ID6	ID7	ID8	ID9	ID10	ID11
Mean	.4727635	.38846960	.3156307	.38553987	.26680185	.36687689	.35662007	.38459119	.30518283	.27811299	.35061650
N	27	97	97	22	92	74	61	97	71	94	72
Std. Deviation	.2458662	.17089061	.1620239	.21621602	.19061574	.10150658	.09956065	.11417305	.17584273	.06105947	.10959077

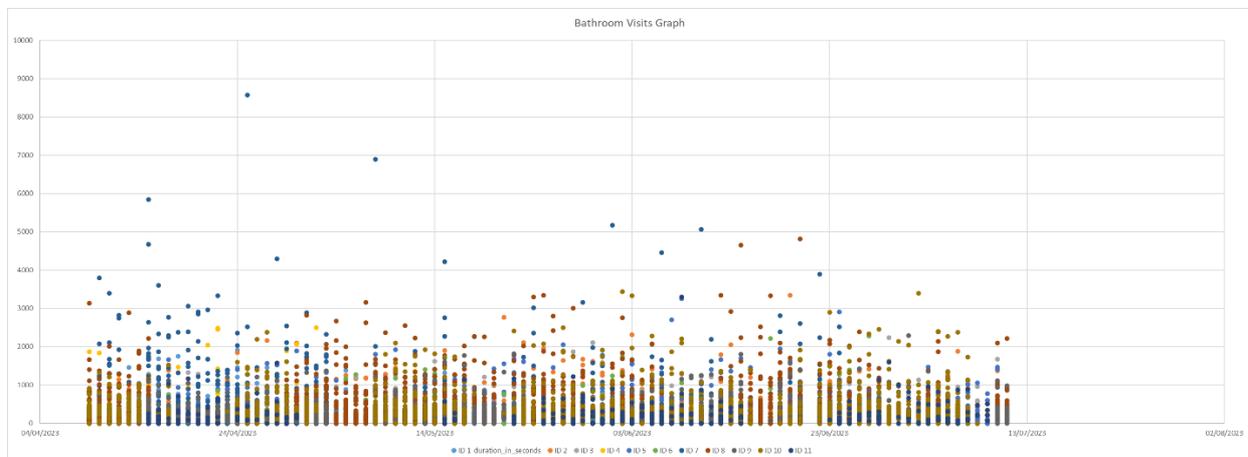
Figure 12. Restfulness scores – Hawkinge House

Figure 12 displays residents' restfulness. The restfulness level is a weighted metric to assess the individuals' sleep efficiency, durations of deep and light sleep phases and rate of disturbances. Resident ID1 displayed the highest mean restfulness score suggesting a higher

efficiency and greater deep sleep phases, however they also presented with the highest standard deviation which reveals that the restfulness of their sleep fluctuated significantly more than the other residents. On the other hand, Resident ID5 presented the lowest mean restfulness however the low standard deviation reveals that this individual experienced consistently unrestful sleep with less fluctuation than the other residents.



Bathroom Visit Counts and Duration

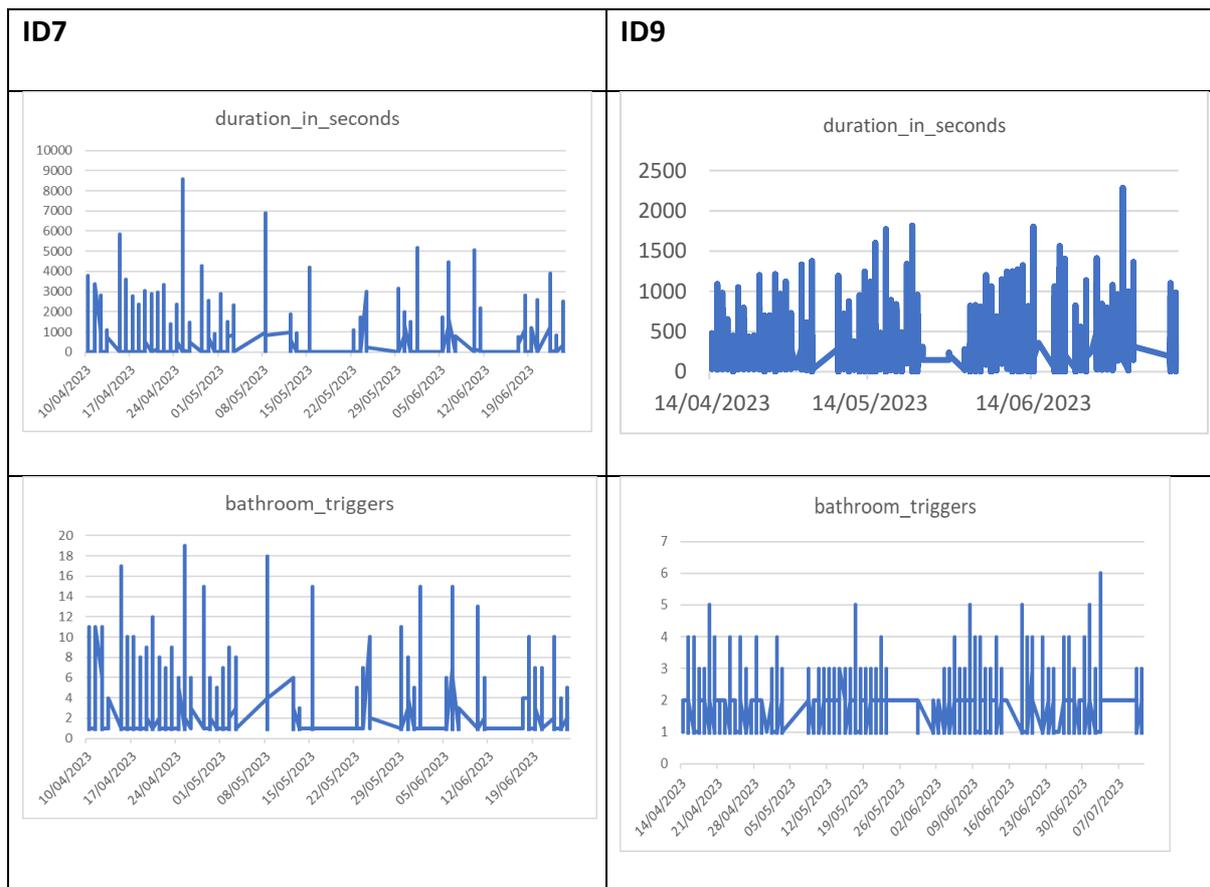


	ID_1	ID_2	ID_3	ID_4	ID_5	ID_6	ID_7	ID_8	ID_9	ID_10	ID_11
Mean	418	457	433	532	324	287.27	566.48	475.76	277.76	449.97	257.39
N	156	432	215	104	1033	370	713	1755	1402	1238	256
Std. Deviation	465	506	471	604	373	347.34	927.75	526.18	262.01	448.56	344.01

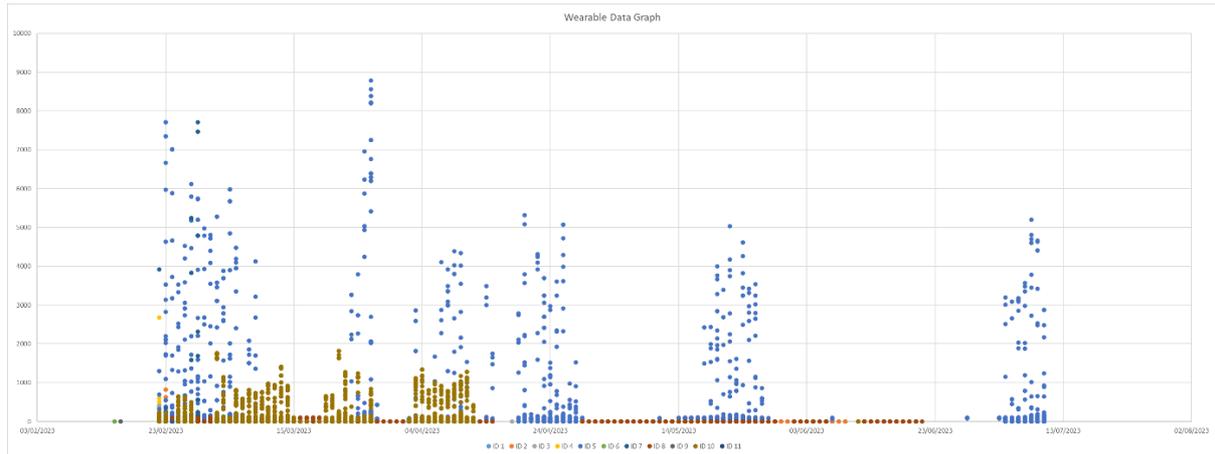
Figure 13. Bathroom visits' count and duration – Hawkinge House

Figure 13 displays the duration of residents' bathroom visits, while the table shows mean duration in seconds (Mean), corresponding visit duration variability (Std. Deviation), and the

number of visit events recorded for each resident. Resident ID7 presented a high mean bathroom duration however the high standard deviation reveals that this individual had great fluctuation in duration and data featured great fluctuations and high numbers of anomalies indicating occasions when the resident might have needed additional support. Resident ID9 presented a similarly high mean bathroom duration however the low standard deviation and more consistent duration reveals that this resident either had a need for support during bathroom visits more frequently, or this might have been the norm for this resident.



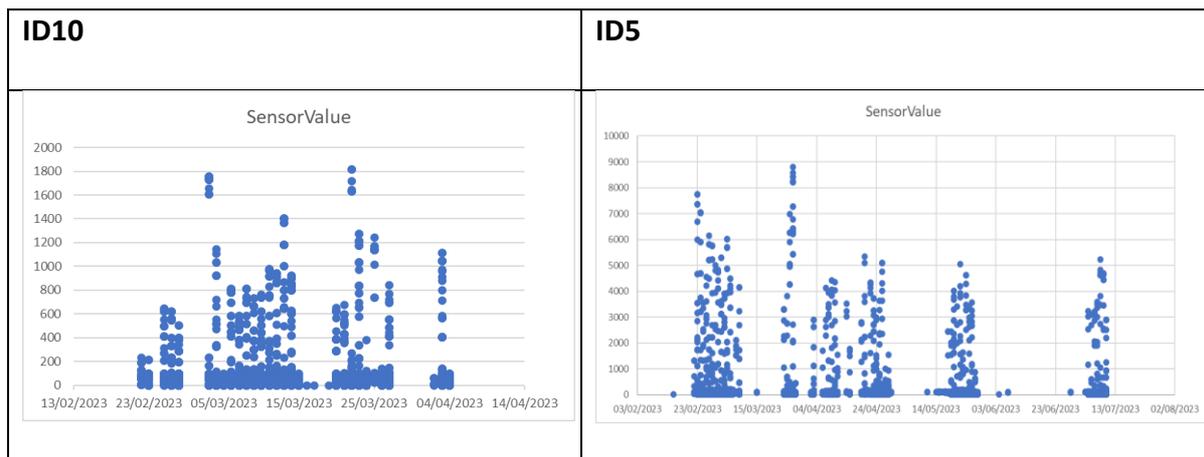
BLE Sensor - Wearable Motion Range Scores



	ID_1	ID_2	ID_3	ID_4	ID_5	ID_6	ID_7	ID_8	ID_9	ID_10	ID_11
Mean	1	21.6	63.8	292.90	306.07	1.00	301.26	52.68	.33	92.05	.
N	1	852	172	15	5735	1	357	1237	3	6879	0
Std. Deviation	*	61.0	68.2	682.98	948.89	NaN	1097.78	42.35	.58	204.41	NaN

Figure 14. *Wearable motion range scores – Hawkinge House*

Figure 14 presents the wearable device (BLE) range levels for residents. The wearable range levels are a weighted metric assessing the range of motion experienced by a wearable device. The table reports average value, variability, and number of events (measurement times) used to calculate the corresponding metric. Residents ID10 and ID5 were selected as the ones with lowest and highest mean values for this metric. These residents also displayed differences in the variability of their corresponding values which possibly indicates variability in their motion patterns during the evaluation period, while it could also indicate inconsistent use of the wearable device. Resident ID10 presented a high range of motion and the highest number of datapoints revealing this resident could have worn the wearable device more consistently than the other residents. Resident ID5 presented a high range of motion and the highest number of datapoints revealing this resident could also have worn the wearable device more consistently than the other residents, however, during those times, this individual experienced greater fluctuations in their range of motion as denoted by the very high standard deviation.



In conclusion, this analysis of monitoring and sensor data reveals the possibilities technology could offer to staff to understand better how to tailor further their support to the residents' behavioural and wellbeing patterns, including quality of sleep, levels of physical activity and movement around the facility, as well as resident safety linked to bathroom visits and daily routines.

6.3. Harmonia Village

As mentioned earlier in the report, Harmonia Village is a community of 30 beds in total in six 5-bedroom houses around a central hub/community centre. Harmonia Village was designed to provide short and long-term residential care for those who live primarily in Kent, including 4-week placement trials and respite care. Some residents would come from outside of Kent if they have family in the area and require 24-hour care. Harmonia Village re-opened in June 2023 and, at the time of writing this report, it had welcomed 2 long-term residents. Both existing and new managers of the facility were invited to a semi-structured interview and were asked similar questions as the manager of Hawkinge House.

As per plan, the six 5-bed houses are held as small communities in individual units, with the central hub or community centre where residents will have the opportunity to *'go out for lunch'*. Those who require long term care are, as reported by the managers, those who are not able to manage at home, are unsafe, and their families are not able to cope with the level of care required.



Homes at Harmonia Village: [Harmonia Village - Welcome](#)

Full assessments are undertaken before residents are welcomed to Harmonia Village, which includes risk assessments, the purchase of any necessary equipment and to assess *'whether we believe that we're able to meet that persons' needs'*. Person-Centred Care assessments take place with the person at the centre and in consultation with family members.

The design of Harmonia village in the smaller houses supports those residents whose behaviour may be triggered by large groups of people. Further benefits to residents of the smaller houses are that they can live with others who are on a similar timeline in their care journeys. The Person-Centred Care assessment supports knowing residents' previous occupations, hobbies, and personalities to facilitate living with others at similar stages of their journeys. The two current residents are reported to be settling into Harmonia Village well, the team have seen a notable difference in the first resident who arrived one week after the facility re-opened. The first resident is *'more settled, knows where the patio is and knows when they want to go out, the door is open'*. At the time of the interviews were conducted, the second resident had also been on location one week, and although early days, was also settling in well, according to the care home manager:

He wanders about the home freely, enjoys his freedom and he likes the calmness and quieter environment.

6.3.1. Perceived Challenges

Staff noted that there could be some challenges initially for overnight cover within the homes and gave the example of staff roving between the houses and in the instance of simultaneous assistance required for residents in different homes. These initial challenges would be overcome by staffing increases. Design improvements such as linking of the houses by conservatories or covered walkways would have been useful, particularly for both staff and residents to connect with other homes. Residents could then have *'a huge expansive area to be able to walk about'*. Currently, staff are using *'hot trolleys'* to transport hot food to residents' homes, having covered walkways would support the movement of residents, staff and visitors in all weathers and ensuring the *'hot trolleys'* didn't get too cold by being outside. Staff also noted that there may have been challenges for residents in care homes where larger numbers of residents had been overwhelming, the environment at Harmonia Village can support those in smaller groups.

6.3.2. Technologies at Harmonia Village

Technologies such as CCTV, M-Fit, Enuresis (bedsheet), radio systems, and hand-held devices were instrumented to be used at Harmonia Village, similarly to the technology setup at Hawkinge House. The first two residents were receiving dedicated one-to-one care and elements of the technology were not yet fully deployed.

6. Overall CASCADE outcomes in the UK

Moore et al. (2015) suggest that positive outcomes may withal occur from some aspects of a programme including circumstances where implementation is not completed as planned. The physical environments at Harmony House, Hawkinge House and Harmonia Village as well as the CASCADE staff training programme were core mechanisms that facilitated achieving positive outcomes for the affiliated organisations, staff, service delivery and local communities.

- Both CASCADE-funded facilities provided employment opportunities for the local people during the construction phase and as establishments. Harmony House currently employs about 40 staff from the locality.

- Partners valued the mutual learning and the supportive networks formed. One of the site project representatives commented:

I kind of thought it would be just the processes with the project, which are very bureaucratic but the actual interactions with the other groups and the other individuals is not like that. It has been really much better than I thought it would be.

- CASCADE staff training enabled the workforce to broaden their skillsets in addition to improving dementia awareness across the organisation. Staff trained to deliver the CASCADE model shared the learning to departments in which they were redeployed. A Harmony House site representative iterated:

I think that will be one of the legacies, once the project finishes, that dementia awareness will continue, because we've got a lot of people now with a vested interest in supporting people with dementia.

- MCH reported observable service improvements at NHS Medway Maritime Hospital and attributed these to the extra capacity Harmony House provides that enables quicker access to acute care beds.
- Despite the complexities involved in calculating hospital bed costs, EKHUFT and MCH estimated to each have reported annual cost savings of over €300,000 from the community beds. In addition to improving hospital patient flow, the community beds provided business continuity to recoup costs that MCH and EKHUFT would have incurred in search of other community care arrangements.

7. Challenges of CASCADE programme implementation

- The time lapse between applying for funding and constructing the facilities implied significant disparity between estimated and actual cost of the constructions.
- The constant changes in exchange rates exasperated the ability to make near actual building costs estimates.
- The COVID-19 pandemic had critical effect on the UK sites' work as partners experienced country-specific pressures on delivering the CASCADE model of care as originally planned.

For example, the pandemic affected in-person interactions with cross-border partners as well as opportunities of sharing lessons learned from implementing the CASCADE programme. Also, the pandemic disruption impacted significantly on the original evaluation planning to evidence more systematically and for a longer period of time health and wellbeing outcomes of the CASCADE model implementation in the two UK sites. Nonetheless, commitment from UK partners enabled a measured process evaluation of the activities undertaken to co-produce the CASCADE model of care and the implementation activities during and following the pandemic period, as well as the impact on residents, families, staff, and the wider community.

8. Recommendations

- Providing regular refresher staff training sessions may facilitate dissemination of the model beyond organisational boundaries.
- More involvement with colleagues from the local authority would enhance the synergy of community integrated dementia care.
- Developing organisational staff exchange programmes for a specified time span may model the CASCADE ways of working into other services where the workforce may not necessarily be working with people living with dementia.

9. Conclusion

CASCADE programme in the UK implementation sites, organisations and local economies reaped numerous benefits from the partnership and the built facilities. The workforce gained more confidence in dementia care and good practice is spreading across departments within these organisations. Harmony House and Harmonia Village continue to support the health and wellbeing of older adults and people living with dementia in local communities.

Moving forward, Canterbury Christ Church University, the main Higher Education provider of the healthcare workforce training in the region, along with EKHUFT and MCH, are part of the CASCADE Cross-Border Training Programme Board which continues the legacy of health and care workforce development and enhancing public perceptions of people living with dementia.

References

- Curry N., Oung C., Hemmings N., Comas-Herrera A. & Byrd W. (2023) *Building a resilient social care system in England: What lessons can be learnt from Covid-19?* Research Report. Nuffield Trust and Care Policy and Evaluation Centre.
- Daley S, Akarsu N, Armsby E, et al. (2022) What factors have influenced quality of life in people with dementia and their family carers during the COVID-19 pandemic: a qualitative study, *BMJ Open*, 12(2), e053563.
- Martin, A., & Hatzidimitriadou, E. (2022). Optimising health system capacity: a case study of community care staff's role transition in response to the coronavirus pandemic. *Health & Social Care in the Community*, 30(5), e2147-e2156.
- Moore, G. F., Audrey, S., Barker, et al. (2015). Process evaluation of complex interventions: Medical Research Council guidance. *BMJ*, 350.
- NHS England (2023). *New: NHS pressure continues as hospitals deal with high bed occupancy*. 19 January 2023. [Accessed at: <https://www.england.nhs.uk/2023/01/nhs-pressure-continues-as-hospitals-deal-with-high-bed-occupancy>]
- Nuffield Trust (2022). *Emergency Re-admissions*. [Accessed at: <https://www.nuffieldtrust.org.uk/resource/emergency-readmissions>]
- Pfadenhauer, L. M., Gerhardus, A., Mozygemba, et al. (2017). Making sense of complexity in context and implementation: the Context and Implementation of Complex Interventions (CICI) framework. *Implementation Science*, 12(1), 1-17.
- Reed S.J., Schlepper L. & Edwards N. (2022) *Health system recovery from Covid-19: International lessons for the NHS*. Report. Nuffield Trust.
- Sirdeshmukh, D., Singh, J., & Sabol, B. (2002). Consumer trust, value, and loyalty in relational exchanges. *Journal of Marketing*, 66(1), 15-37.
- Sriram, V., Jenkinson, C., & Peters, M. (2020). Carers' experience of using assistive technology for dementia care at home: a qualitative study. *BMJ Open*, 10(3), e034460.
- Summoogum, K. & Das, D. (2023) *Revitalising Care Homes: A Look into MiiCare Data Driven Approach to Improve QoC & Operational Efficiency in Care Homes Across the UK*. MiiCare, UK.