



Evaluating the Assistive Technology Pilot in Adult Care Services: Lessons Learned

Dr. Khadija Mohamud, Research and Evaluation Officer



Setting the Scene





A review of the journey: Reflections from the Assistive Technology Strategic Lead



AT Evaluation Objectives

Process Evaluation

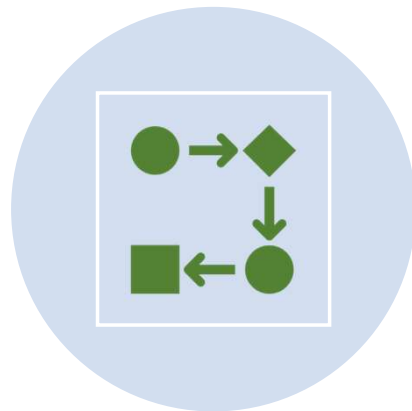
- ❖ Cohort demographics engagement.
- ❖ Project stakeholders' collaboration and processes.
- ❖ Frontline staff engagement.
- ❖ Data Inspired Living data.

Outcome Evaluation

- ❖ **Increase efficiencies (cash and/or time releasing) from the investment in AT**
- ❖ Reduce the number of avoidable emergency admissions and readmissions into hospital
- ❖ Reduce or delay the use of care homes
- ❖ Improve or maintain resident independence
- ❖ Improve care planning using AT
- ❖ Reduce pressures on family carers and improve their quality of life (covered in the four objectives above)



Initial Evaluation Methodology



**Randomised Control Trial
(with adaptive randomisation)**



In-depth case studies

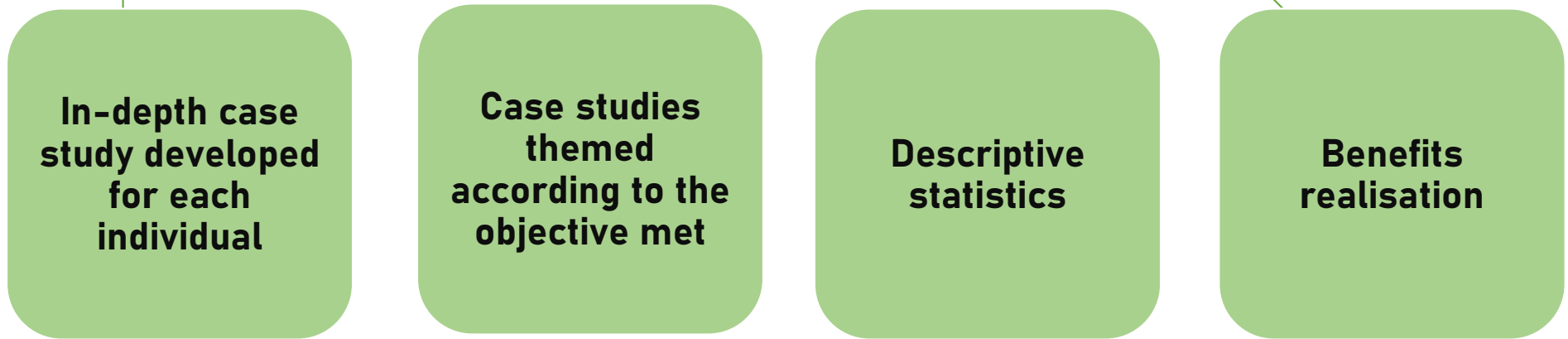


Applying Flexibility: Changes to the methodology

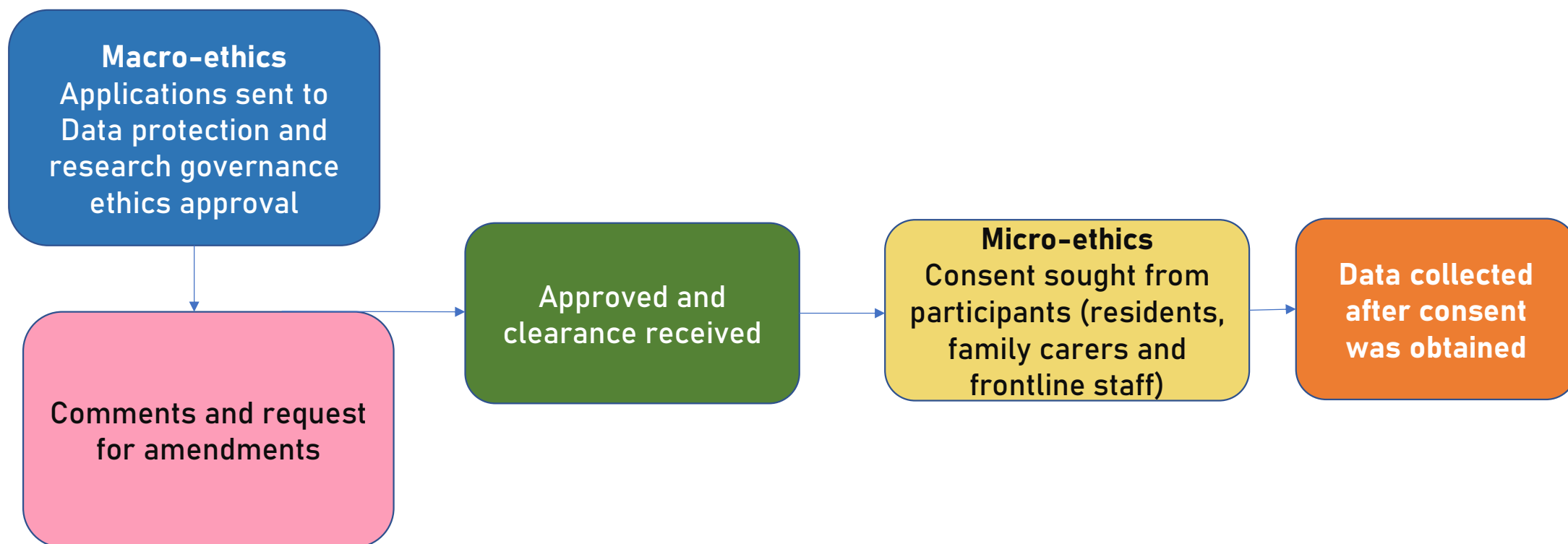
At three months, the evaluation data started to show:

- **Some evidence of benefit** (and no evidence of harm) in using AT to achieve desired outcomes in the intervention group.
- A large **difference in outcomes at baseline** (despite being randomised according to risk score and having similar demographics) was seen between the **control and intervention groups**.
- **All cases** within the study were so **unique**. Vastly different circumstances (e.g. personal health, social situation) were **masked** in an aggregated dataset. Richest data occurs when triangulated for each case.
- **Small sample size** meeting each objective
 - **Large dropout rate** due to age of cohort referred in (85+) and onboarding delays has resulted in a very small control group at 3 months, meaning robust statistical analysis isn't possible.
 - A **low engagement** with some of the evaluation activities from both intervention and control group residents/carers.
- Recommended new methodology was still in line with **current literature**.

New Evaluation Methodology

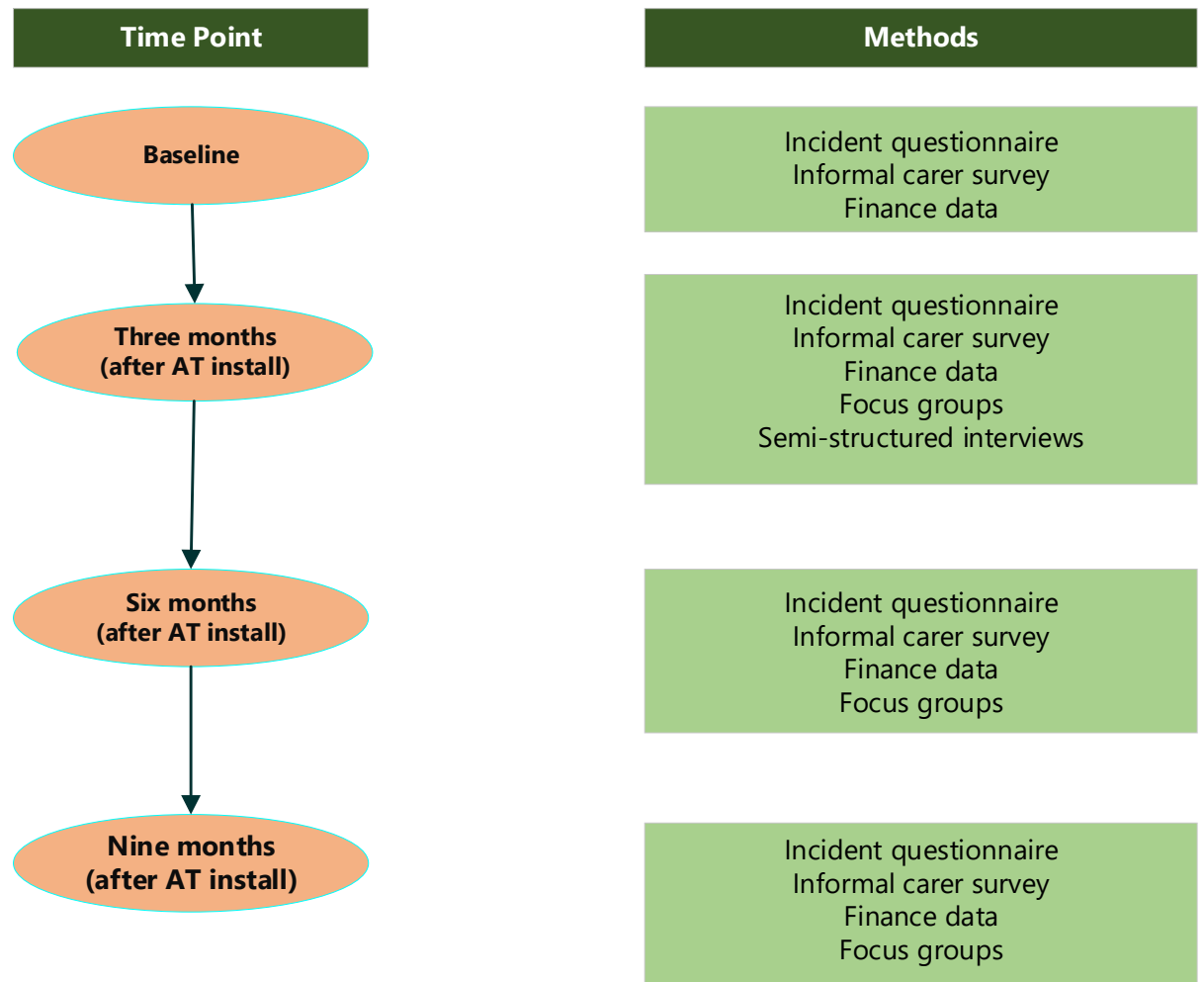


Ethics and Consent





Data Collection Schedule and Methods



Process Evaluation: Challenges and Mitigation

Challenge	Cause	Consequence	Mitigation	What processes were put in place to mitigate the issue?
<p>DATA QUALITY:</p> <p>Variable quality of data reaching DIL means outputs/alerts not always reliable.</p>	<p>Complexity of dashboards/ algorithms involved (new technology).</p> <p>Sensitivity of Data Inspired Living to poor quality data from sensors (e.g. caused by sensor placement, sensors failing or low batteries). Data format changes from current provider affect DIL.</p> <p>Issues with toilet sensor alerting.</p> <p>Issues with falls watch configuration and alerting.</p>	<p>Intervention was not working as intended for some residents. Falls detection not deployed as per original timeline.</p> <p>Reputational damage as FLW lose faith in DIL/AT and disengage.</p> <p>Falls preventative alerts also lead to reputational damage and disengagement from residents/family carers.</p> <p>Safety of residents brought into question when appropriate alerts not generated.</p>	<p>Switchover from Azure to AWS system in September 2022.</p> <p>Small focussed AT team regularly monitored the dashboard.</p> <p>Continual service improvement processes were put in place to ensure data quality issues were resolved in a timely manner.</p>	<p>A new ticketing system in AWS alerts was applied. New alerts from a sensor do not go into the system until a previous an alert is closed down.</p> <p>Designed and developed a set of rules for alert parameters. AWS system is more refined to ensure parameters are tailored to each individual.</p> <p>Learnt about the importance of sensor positioning and ensuring if they are working.</p>



Data Quality Issues: Example Quotes (three months)

...one sensor that I just can't get the hang of is the toilet sensor because all of my dashboards tell me that people are **going to the toilet 36 times a day**, and I'm like, "I definitely don't think that's accurate"...

Community Care Officer, AT Champion

...I receive **alert emails** sometimes which says that there is **no activity in the downstairs hall, lounge or kitchen** between **4am and 10am**. [...] It might be **more appropriate to be 5am to 11am**, something like that. [...] The other one which **triggers quite often** is there's an alert which says that there's **no activity outside the kitchen in the last hour**. [...] **One hour isn't necessarily a wide enough window**...

Family Carer Interview

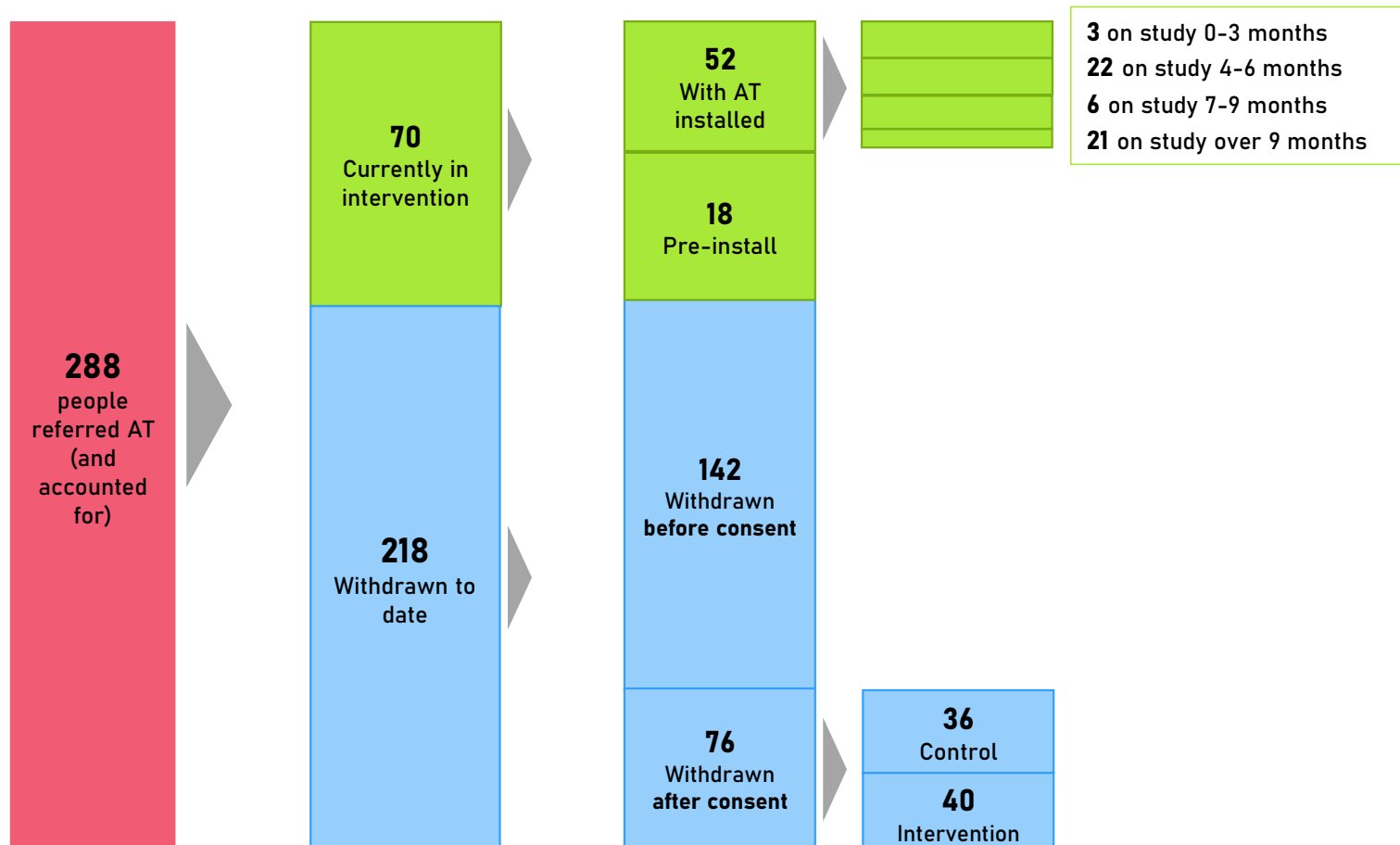
Process Evaluation: Challenges and Mitigation

Challenge	Cause	Consequence	Evaluation recommendations	What processes were put in place to mitigate the issue?
<p>COMPLEXITY OF PILOT PROCESSES:</p> <p>Onboarding process not completed in a timely manner for all referrals</p>	<p>Process is complex with multiple handovers and parties involved.</p> <p>Process under continual review/improvement due to pilot status.</p> <p>Lack of oversight and management of process by AT team.</p>	<p>Evaluation not working as intended/planned; residents and carers not baselined at true baseline point.</p> <p>Evaluation timelines extended.</p> <p>High dropout rate due to long periods between contact with residents/carers resulting in small sample size.</p>	<p>Introduction of Onboarding checkpoints and cross checking exercise.</p> <p>Improvement in project management to ensure oversight of operational and technical processes through a project plan and weekly updates.</p> <p>Improved communication between project team, technical team and providers.</p>	<p>A more active 'hands on' approach demanded by nature of solution i.e., development of a project plan and weekly progress meetings.</p> <p>Streamlined partnerships between the project team, technical team and providers.</p>

Process Evaluation: Challenges and Mitigation

Challenge	Cause	Consequence	Evaluation recommendations	What processes were put in place to mitigate the issue?
<p>COMPLEX DASHBOARD DATA:</p> <p>Frontline Worker Engagement (FLW)</p> <p>Family Carer Engagement</p>	<p>FLW do not understand the different tiles on DIL dashboard and feel overwhelmed with the data.</p> <p>Limited use of DIL data in care reviews by FLW.</p> <p>Family carers find it difficult to understand the data interface on Cascade dashboard .</p>	<p>Limited use of DIL data in care reviews.</p> <p>Disengagement with dashboard data from FLW and family carers due to the gap in knowledge.</p>	<p>Ensure the data is easy to understand to encourage FLW and family carers engagement with the dashboards.</p> <p>Conduct trainings on dashboard data either before or during the AT install for both FLW and family carers to ensure they are conversant with the data.</p> <p>Consider utilising pictorial or more engaging interface on the dashboard.</p> <p>Engagement with care agencies for them to identify how AT data could be used to inform their work.</p>	<p>Co-production with two carers for the carer dashboard.</p> <p>Co-production with AT champions for the professionals' dashboard.</p>

Study Participants Flow

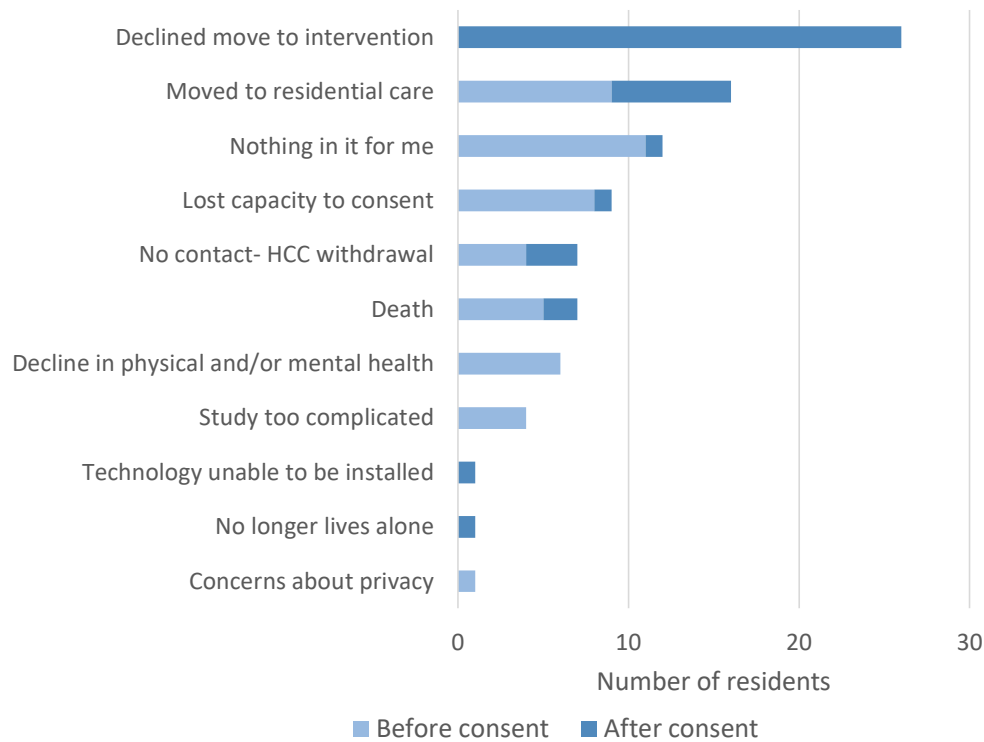


AT pilot was open to residents across five districts in Hertfordshire, who (a) lived alone and had their own front door, (b) had capacity to consent, and (c) had an identified risk that AT could assist with.

Reasons for withdrawal from the study

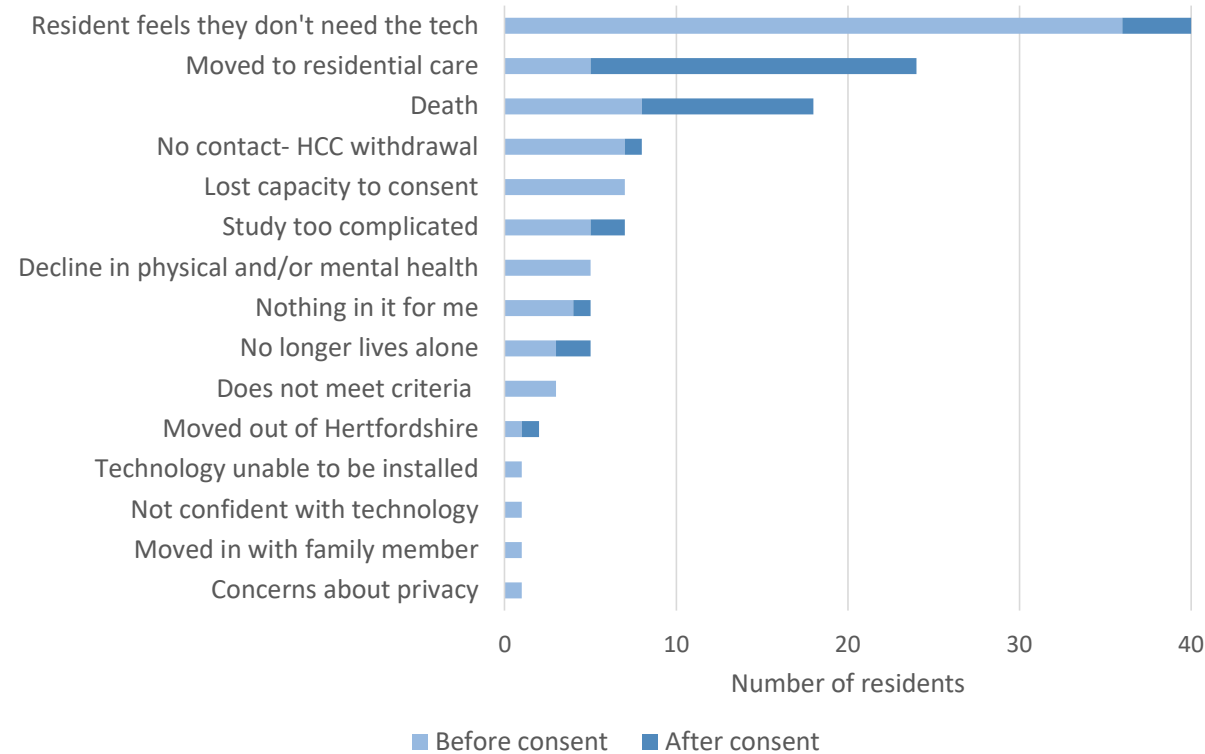
218 withdrawals overall in pilot study.

Reasons for withdrawal from the control group



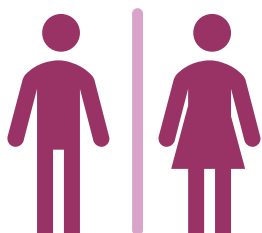
There were 90 withdrawals from the control group and 53% of these residents withdrew before consent.*

Withdrawals from the intervention group



There were 128 withdrawals from the intervention group and 69% of these residents withdrew before consent.

What type of resident was supported to meet an AT outcome?



Gender appeared to have **no impact** on whether the resident was supported to meet their AT outcome.



Age, health and disability appeared to have **some impact** on whether the resident was supported to meet their AT outcome.

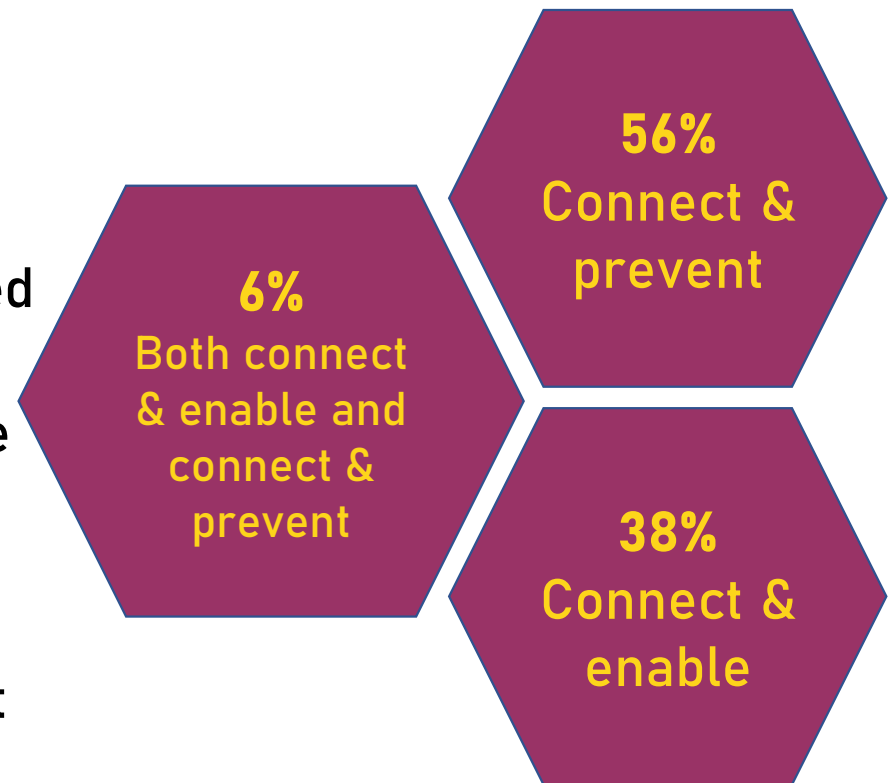


Little to no impact of presence of family carer on residents' outcomes. Engagement of family carer in using dashboard had **some impact** on whether the resident was supported to meet their AT outcome.

Connected Lives Outcomes Met

46 residents in the case study cohort had known or relevant Connected Lives outcomes listed. **Of these:**

- 52%** supported by AT to meet a Connected Lives outcome.
- Some data to suggest a further **17%** were supported by AT to meet a Connected Lives outcome (**weaker evidence**).
- Independence and remaining at home** were the **most common themes** amongst met Connected Lives outcomes achieved by study participants.





Connected Lives Outcomes: Example Case Studies

Case study 1

Resident: Pippa, 87, with dementia diagnosis.

Situation: Pippa was keen to return home from hospital, and she did with AT and commissioned care. Family were firmly against this.

Connected Lives outcomes (desired):

- I would like to return home with support.
- I would like to remain safe in my home.
- I would like to enhance my social interaction.

Connected Lives outcomes (achieved):

Returned home and remained there for as long as she was safe. AT data monitored safety, social interaction and prompted a conversation about a befriending service.

Case study 2

Resident: Ingrid, 86, has cancer diagnosis and several additional health conditions.

Situation: Resident had never lived alone before and was feeling anxious about this. She had good support from a family carer and no formal care.

Connected Lives outcomes (desired):

Maintain physical and mental health and emotional wellbeing

Connected Lives outcomes (achieved):

Preventative alerts generated around mobility, routine, toilet-usage and the environment have prompted contact and checking in with family carer and the resident. The resident feels reassured by the close monitoring.

Outcome Data: Cost efficiencies through investment in AT



Data collected through this evaluation suggests that AT supported HCC with saving a maximum of £41,290 by delaying or preventing a move to residential care for four residents and the reduction of package of care for one resident within the duration of the pilot.

All five residents were **below the threshold but contributed to the cost of their care package**. Contributions may have increased following move to care home.



Data indicates a **funding increase of £358** was required for **one** resident to increase care package to **ensure safety at home**. Dashboard data highlighted that the resident could not manage daily tasks on their own.

More time and data needed to understand longer term impact of cost savings and increase in funding.

Outcome Data: Time efficiencies through investment in AT

11 practitioners took part in the study through **focus groups** and a **survey**.

Improved efficiency at work for practitioners who took part in the study.

Provided supporting evidence to:

- ❖ **Establish streamlined partnerships** with other teams and care agencies.
- ❖ **Understand patterns and behaviours through data.**
- ❖ Highlight **residents' activities and provide reassurance** to help **maintain their independence at home.**

Emerging themes

UTI detection
Practitioners' reassurance
Inform proportionate package of care
Identify safeguarding concerns

Change in behaviour and patterns
Better collaboration with care agencies
Data informed communication with other teams
Informed decision-making using data
Nutrition management
Family reassurance



Time efficiencies from the investment in AT: Example Quotes

...we work a lot with the carers' assessments as well with the Extended Involvement Team and **that [AT] can be quite a handy tool**...just seeing it as an app and clearly knowing things are working. If they're not, then quicker reviews happen... **I see it as an improvement in our relationship with the agencies** as well because obviously you're going with what they say, what they write in notes and then putting it all together, **you can cross reference everything, which we haven't been able to do before.**

Practitioner, Post Hospital Review Team

I think the **motion sensors work really well** because it may be that they're falling at night, and **then you can find out the reason they keep falling at night** because of the motion sensors... it could be... they're using the toilet more frequently and flushing it, so it will pick up that they may have a UTI. Then **they can pick that up earlier than them getting to the point where they're really confused and having to go to hospital...**

Practitioner Early Intervention Team

Outcome Data: Reduce the number of avoidable emergency admissions and readmissions into hospital

Three residents met this as a primary outcome. One resident met this as a secondary outcome

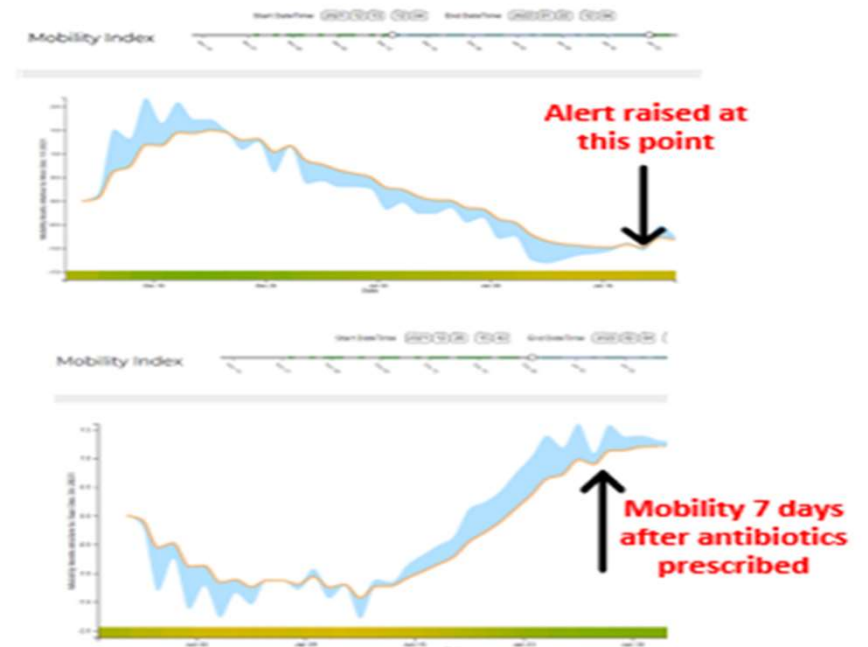
AT supported in the **identification of a UTI through preventative alerts for three residents.**

Reduced mobility and change in toilet usage identified.

Responders contacted GP who prescribed antibiotics for residents.

AT data support reduction in avoidable emergency hospital admission through **early identification of infection.**

Example case: dashboard data



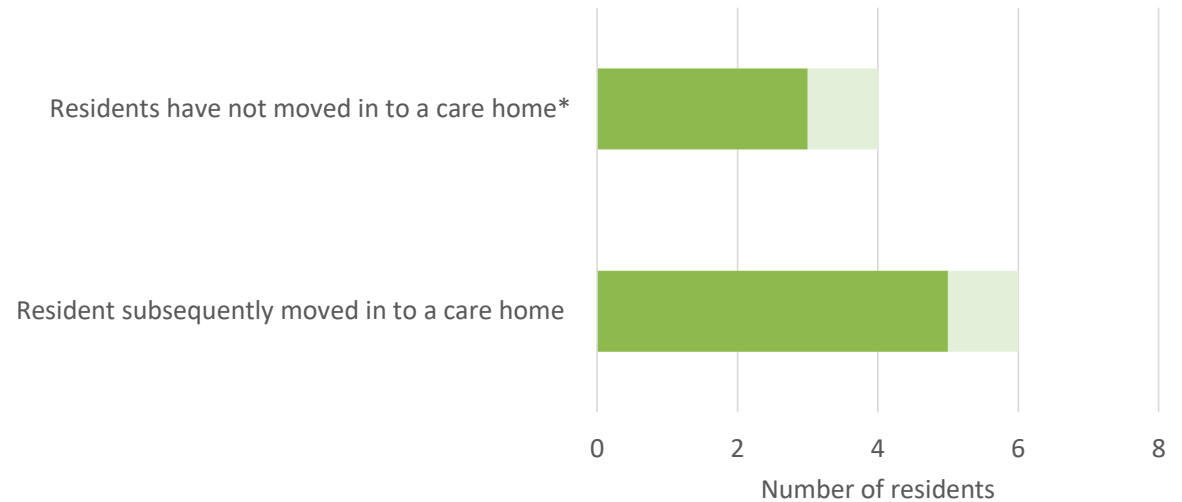
Data from 69 residents in case study cohort who had AT installed for 3 months or longer.

Outcome Data: Reduce or delay the use of care homes

Eight residents met this outcome and two residents partially met this outcome

Data shows that AT helped in delaying the move to residential care, a cost of **£22,239** in total for **four out of sixty-nine residents** may have been saved.

Number of residents who met or partially met AT outcome of reduce or delay the use of care homes



* As of 31st January 2023

■ Outcome met ■ Outcome partially met

Residents were on the study for an average of seven months.

Data from 69 residents in case study cohort who had AT installed for 3 months or longer.

Data from 69 residents in case study cohort who had AT installed for 3 months or longer.



Outcome Data: Improve or maintain resident independence

Outcome met by **14** residents (eight as primary outcome, six as a secondary outcome).

- **50%** of these residents met a secondary outcome of 'Reduce pressures on family carers and improve their quality of life'.
- Partially met by **six** residents.

Maintaining level of independence

10 out of 14 who met this outcome

- Through monitoring and preventative alerts.
- Resident's routines established so that if something appears off, it can initiate an immediate response e.g. prompt to resident or conversation regarding care package.
- AT data supports family and/or formal carers in their caring roles.
- Provides reassurance and evidence that they are managing well on their own.

Improving independence

4 out of 14 who met this outcome

- For three residents, AT reassured the resident, and consequently they felt more confident on their own.
- AT supported the reduction of the remaining resident's care package through demonstrating medication adherence.

'I have checked on the Assistive Technology dashboard which shows Richard (pseudonym) has been accessing his medication for the last two weeks regularly.'

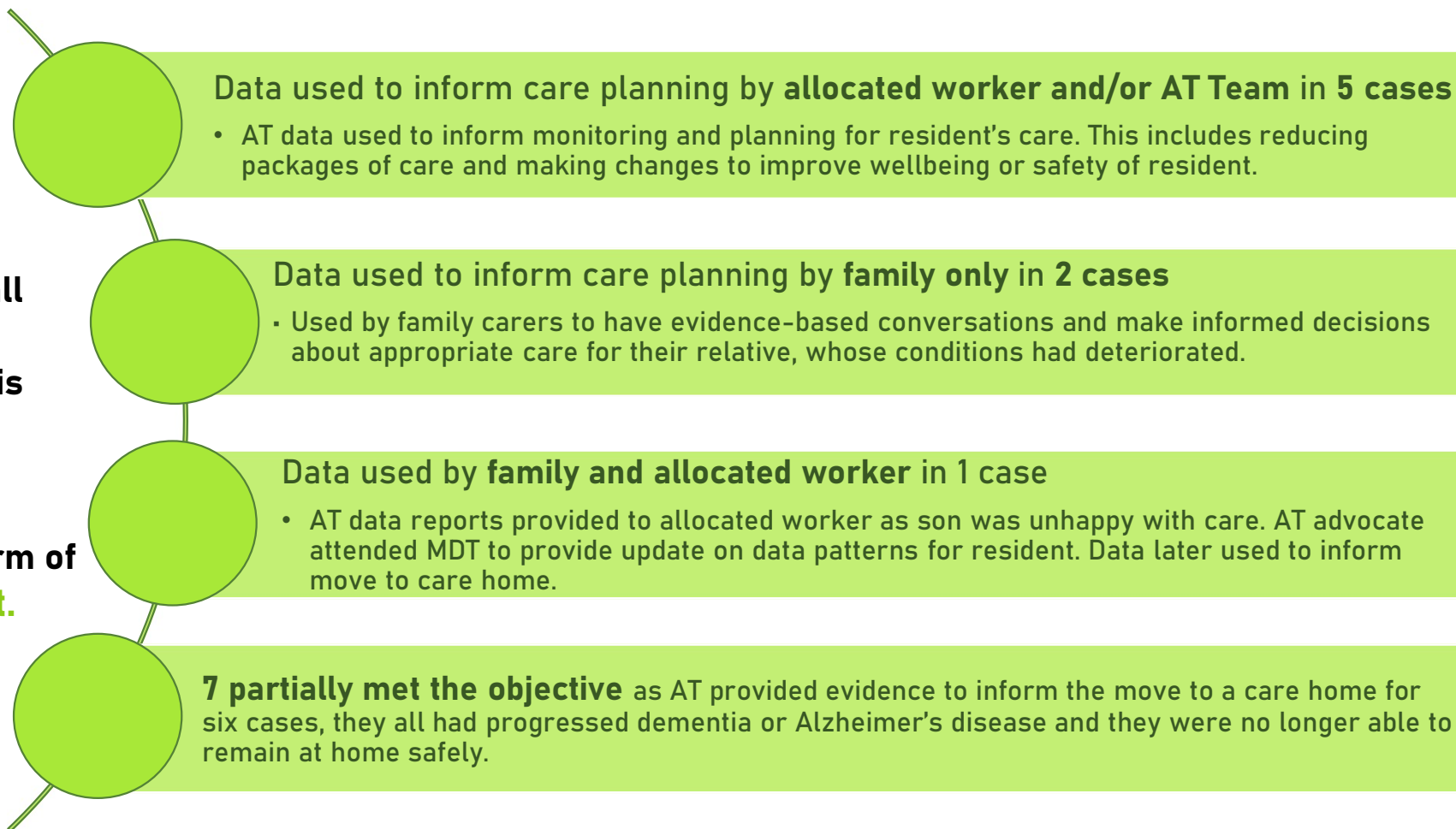
Community Care Officer

Outcome Data: Improve care planning using AT

Eight residents overall met this outcome.

Seven partially met this outcome.

The majority of these residents had some form of **cognitive impairment**.



Data from 69 residents in case study cohort who had AT installed for 3 months or longer.

Case study: Care planning using AT

Case study 1: Where AT has effectively supported with care planning - 10 months on the study.

Resident: Reggie, 70 years old, has epilepsy and one other condition.

Situation: Initially, the resident's care provider asked for an **increase in care package by 440%**. However, the allocated case worker believed AT could be used to inform this decisions regarding care.

Outcome: AT sensor data showed the resident had a **consistent weekly routine** and was **managing his daily tasks effectively with little support needed**. Preventative alerts were closely monitored by AT advocates. AT dashboard data enabled the allocated worker to have **evidence-based conversations with the care provider**, which led to a **50% reduction in the package of care**. **£2,919** was saved to date. Resident remains on the study.

Case study 2: Where AT has not effectively supported with care planning - 6 months on the study.

Resident: Max, 22 years old, has epilepsy.

Situation: Resident recently moved out of his family home and wanted to have AT in place as a **preventative measure** for the **seizures** he experiences.

Outcome: There was no evidence of the data being monitored or used by a practitioner or family carer. The resident indicated at three months, "...[I] **feel reassured by having this and know my family can see the dashboard as well**". There was no family carer/next of kin who was involved in the study. The data showed **no evidence of positive impact** and **no harm caused by AT**. At six months, the resident felt they no longer needed the technology and **withdrew from the study**.

Outcome Data: Reduce pressures on family carers and improve their quality of life

Twenty-one residents met this outcome and eight residents partially met this outcome.

"Sensors worked very well as mum had a fall a couple of weeks ago late at night and I detected there was no movement, When I got there, she was lying across the corridor..."

Family Carer

I have gotten to know her 'routine' and this really helped highlight one morning when she went out and didn't come back after half hour (her usual routine) - she had gone out taken a wrong turn and gotten confused. But knowing this I knew to leave work and go look for her (I found her!) but then realised she was more confused than normal... without the assistive technology I would not have discovered this for several more hours (until I left work) by which point I dread to think what might have happened.

Family Carer

Reduce pressures on family carers: Supporting evidence from dashboard data

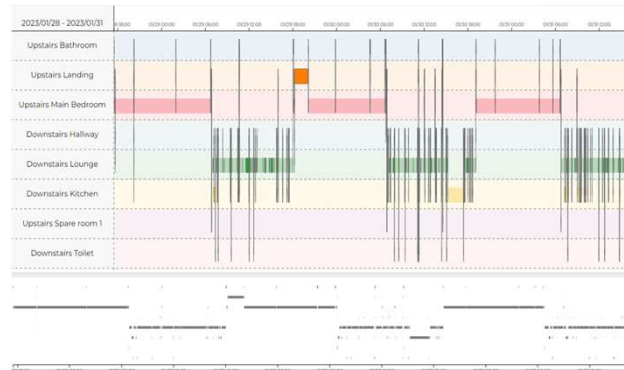
The AT has helped relieve quite a lot of the anxiety. It's definitely helped from that perspective, ...**mum doesn't have a care package**... All the things she'd potentially need care for, like washing or cleaning that sort of thing, she can do for herself. **It's just the dementia side and forgetfulness, so the AT helps us know she's eating and drinking or moving about. It's a watching eye**, which is helpful when we're not about. We have other responsibilities too; our son has severe mental health needs...

Family Carer

"The data from the dashboard informed our decision to take her to a care home. It was distressing to see how quickly she deteriorated, and **the data enabled us to make a decision sooner rather than later. If we hadn't had the technology, we would have kept mum at home longer and that would have not been a positive outcome in terms of the rapid progression of the dementia**"

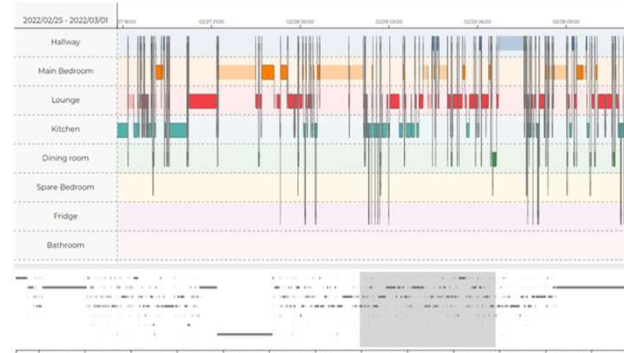
Family Carer

Activity routine recorded between 28/01/23 – 31/01/23



- Activity routine consistent, but more movements between rooms have been identified than previously seen.
- Behavioural changes, increase in repetitive action, a characteristic of cognitive decline.
- Resident remains at home with no care package.

Night time activity recorded between 25/02/22 – 01/03/22



- Increase in night-time activity, a characteristic of cognitive decline.
- Safety issues raised e.g. locking self out of house.
- Repetitive activity causing fatigue and increasing risk of falls.
- AT data provided supporting evidence for a move to a care home.



Key findings: Who AT has worked well for and who AT has not effectively supported within the AT pilot study

Residents with early stages of cognitive impairment (incl. dementia)

Residents with family carers who regularly check the dashboard

Residents with progressed or rapidly declining cognitive impairment (incl. dementia)

Residents who are unable to mobilise

Residents whose informal carers are at risk of carer breakdown

Residents who require preventative support

Residents with privacy concerns who do not readily engage or cooperate

Identification of residents with safeguarding needs

Key findings limited to known limitations of the pilot study.



Key findings: Cont'd

Evaluation data demonstrated that **AT has supported some residents to maintain or improve their independence and remain at home** for as long they are safe. Further data is required to understand if maintained independence does lead to reduced use of care homes.

Data suggests **AT is more likely to delay move to a care home**, rather entirely prevent their use.

A high percentage of case studies withdrew from the pilot (over half), with 44% withdrawals moving to a care home and a further 23% who passed away.

AT cannot keep people safe if leaving the property at night/in early hours of the morning but **can identify when this is happening**.

The nature of pilot testing and refining who AT can and cannot effectively support has impacted on the sample size and strengths of evaluation conclusion.



Limitations of the evaluation data

- **Large dropout rate** due to age of cohort referred in (85+) and complexity of health conditions experienced by cohort.
- **Small sample size** meaning no statistical test was performed and it is difficult to provide conclusive outcomes on who AT effectively supports and who it does not.
- **All residents have a unique set of circumstances**, with **many factors** contributing to whether outcomes were met or not. This adds to the difficulty of concluding who AT effectively supported to meet their outcomes.
- Baseline data for many participants was not collected at true baseline due to onboarding process taking a long time.
- Engagement in completing time-point questionnaires dropped off after three months.
- Reliant on recall (*apart from finance data*).
- **Many people in AT team involved in data collection.**
- **Original protocol design not appropriate** with low resources, time constraints and this population and largely restricted data availability for case studies.
- Evaluation data limited, due to it being a pilot study e.g. low frontline staff engagement.

AT Pilot Successes: What worked well

Swift turnaround within the AT team in supporting frontline staff to resolve an AT related issue.

Some frontline staff have had a really good experience with using the dashboard data to inform their decisions on care package for some high demanding cases.

AT was used as a preventative measure to support residents to live at home for longer where possible and safe.

Removal of the control group created a better experience for frontline workers as they no longer have to have difficult conversations with families on randomisation.

Streamlined Project Management within the AT team.

Strong working relations with partners was established i.e., AT installation partners, care agencies and health colleagues,



Final reflections: AT Strategic Lead





Q&A Session

Further questions for the Research & Evaluation Team

 PH.Evaluation@hertfordshire.gov.uk

