Supplementary Information

Methodology

Online surveys

The University of Birmingham commissioned Research Now to develop an online version of the survey tool that allowed collection of data on individual tenants at two time points from providers. The University of Birmingham developed draft questionnaires with the client and KPMG and these were tested with a small number of sites to check for ease of completion and survey burden. Feedback from these sites resulted in both a reduction and simplification of financial information collected from care managers. The survey then went through a period of live piloting with necessary changes made by Research Now before the survey was finalised. Research Now included plausible ranges and checks for the financial questions and these needed to be adjusted or removed for some questions to accommodate financial information for support packages that were outside the range of costs originally anticipated.

Research Now provided updates on which sites had completed their questionnaire twice a week to the Just Checking project manager to enable reminder emails with links to be re-sent to care managers and follow-up calls to maximise the response rate.

Originally the intention was to send out the follow up survey six weeks after the baseline survey. However, it became clear that providers were taking more time than anticipated to install the equipment, and analyse and use the data generated in reviewing care provision. A decision was taken

to use intelligence from each area to decide when providers were in a position to send out the follow up survey (in most cases this was around 3 months after installation).

Process for ensuring anonymity of service users and settings

It was requirement of the University of Birmingham ethics committee that the evaluation team used anonymised data. The following protocol was developed to ensure this:

- Unique identifiers were produced and used to populate individualised questionnaires for each setting.
- Each setting had its own unique link to the baseline and follow-up survey
- Each local authority had 50 pairs of links (10 for 1, 2, 3, 4 and 5 tenant settings).
- JC project manager contacted settings (thereby blinding evaluators) recruited to take part in the study and assigned links.
- JC project manager knew names of tenants and assigned a unique identifier for each tenant.
- UoB and JC project manager received regular updates on completed survey. JC project manager followed up none respondents (it was condition of participation in the study that in return for free hire of the equipment sites completed the questionnaires).
- UoB requested data set from Research Now with information removed that would allow identification of who completed the survey. Though it is possible to identify the local authority within which they are located.

Table S1: Topics covered by baseline and follow-up surveys

	Baseline	Follow-up
Type of setting (Residential home; Supported living; Other)	✓	
Type of tenancy (Single; Shared; Other)	✓	
Capacity of residential setting	✓	
Number of individuals currently accommodated	✓	
Week covered	✓	
Cost of all support packages in setting per week	✓	
Core Hours (number, hourly rate, total cost)	✓	
Individual hours	✓	
Waking night support	✓	
Sleep-in support	✓	
Type of assistive technology, cost per week and one-off cost	✓	
For each resident		
Individual care (hours, cost)	✓	✓
Waking night support (hours, cost)	✓	✓
Sleep in support (hours, cost)	✓	✓
Type of assistive technology, cost per week and one off cost	✓	✓
Cost of current package per week	✓	
What care needs lead to level of support provided? Respondents could select from the following: Requires personal care and physical support; Challenging behaviours; Epilepsy; Personal safety and self-harm; Anxiety and distress; Sexual offending risk; Night seizures; Incontinence; Falls; Disturbed sleep patterns/walking in night; Need to be turned regularly. They could also provide information on other needs.	✓	
Anything unusual about the [baseline] week	✓	
Person centred plan (yes, no)	✓	
Date person centred plan last reviewed	✓	
Three most important goals for tenant identified in plan	✓	
How far been able to achieve each goal	✓	
What helps achieve goal	✓	
What hinders achieving goal.	✓	
Since the introduction of JC have potential changes been identified (yes, no)		✓
Plans to implement changes where identified. Respondents could choose from following response options: 'Yes – already done so'; 'Yes – plan to do subject to agreement of LA/ family'; 'Yes – plan to pilot using JC kit to monitor'; 'Yes – but not until new financial year /contract'; 'Note sure' and 'No'.		✓
Reasons for being unable to identify any potential changes in the level of support. Respondents could select one or more of the following response options: 'This individual has shared provision for the type of support we might have considered varying'; 'Need to host a meeting to discuss with professional colleagues'; 'Need to undertake a risk assessment'; 'The monitoring information provided by JC suggests we have the right level of support'; We are required to provide a specified level of support by LA and cannot vary it easily'; 'We like to continue to monitor this individual longer'; and were able to specify other reasons.		✓
Planned changes in assistive technology		✓
Whether Just Checking changed the assessment of tenant. Respondents could from three response options: 'No, Just Checking has provided some information but intend to continue to monitor the individual before revising assessment'; 'No, Just Checking provided information confirming existing assessment'; 'Yes, Just Checking provided information resulted in changed assessment.'		✓
Plans for implementing new support package		✓

Qualitative baseline: defining expectations

While there were differences between areas, a consistent set of expectations emerged:

- **Objective data to make decisions** including information on activity of tenants when staff was not present.
- **Improved and more person centred support** resulting from insights into tenants' needs from activity data being used to inform personal care plans (PCP). Linked to this was **reconfiguration of support** at the individual, setting, provider and commissioning authority level and **better use of resources** with JR approach contributing to improved allocation of limited resources based on the actual needs of users. For example, removing waking night staff because tenants are not active during the night could free resource to achieved unmet needs in their PCP. JR was expected to both provide evidence that could support reducing support (e.g. identifying where staff might be safely withdrawn) and where support needed to be increased. The expectation was that JR would contribute to achieving value for money with a focus on the *'quality of support not the quantity'*.
- **Reassurance on existing and planned care packages.** JR could alleviate staff anxiety and concerns about staffing and whether the needs of individuals are were being met (e.g. by providing a more accurate view of activity during the night).
- **Sense of surveillance by tenants and staff:** While potentially positive (sense of security; *'Keeping people safe'*) there were concerns about '*big brother*' style surveillance that would need to be managed.
- **Group dynamics.** JC would provide an overview of activity over a period of time and help staff identify behaviours previously that might explain poor group dynamics (e.g. disruptive behaviour resulting in not sleeping at night).
- **Improved wellbeing outcomes for tenants** including self-worth, autonomy, improved skills, opportunities, fulfilment, happiness, social contact and being able to go out independently. Some outcomes were specific to changes that JR might identify such as removal of waking night staff would create greater privacy and better quality of life through not being woken at night.
- **Independence and autonomy** by providing evidence where and when it would be appropriate to remove care staff and with continued monitoring AWLD would have an opportunity to develop independence and confidence.
- **Support culture change** from one of staff encouraging dependency and being risk adverse to more evidenced based person centred care based on a better understanding of individual's capabilities. JR would provide an opportunity for staff to reflect, learn, to find ways to improve care including taking calculated risks and challenge existing arrangements.
- **Improve organisational reputation** through the promotion and celebration of providers using an evidenced based approach to providing support.

Outcomes for commissioners were influenced by local factors including providing evidence that some AWLDs may be in inappropriate accommodation or the need to support changes to commissioning care. Generally commissioners emphasised better allocation of resources over savings while acknowledging there was pressure to reduce costs. JR was seen as an opportunity to build a new level of trust and understanding of care needed for discussions with providers.

Survey findings

Use of Assistive Technology

Respondents to the baseline survey were asked to describe the use of any assistive technology for individual tenants. Only a quarter of tenants (22.8 per cent) were using any assistive technology. Responses were coded into the following categories:
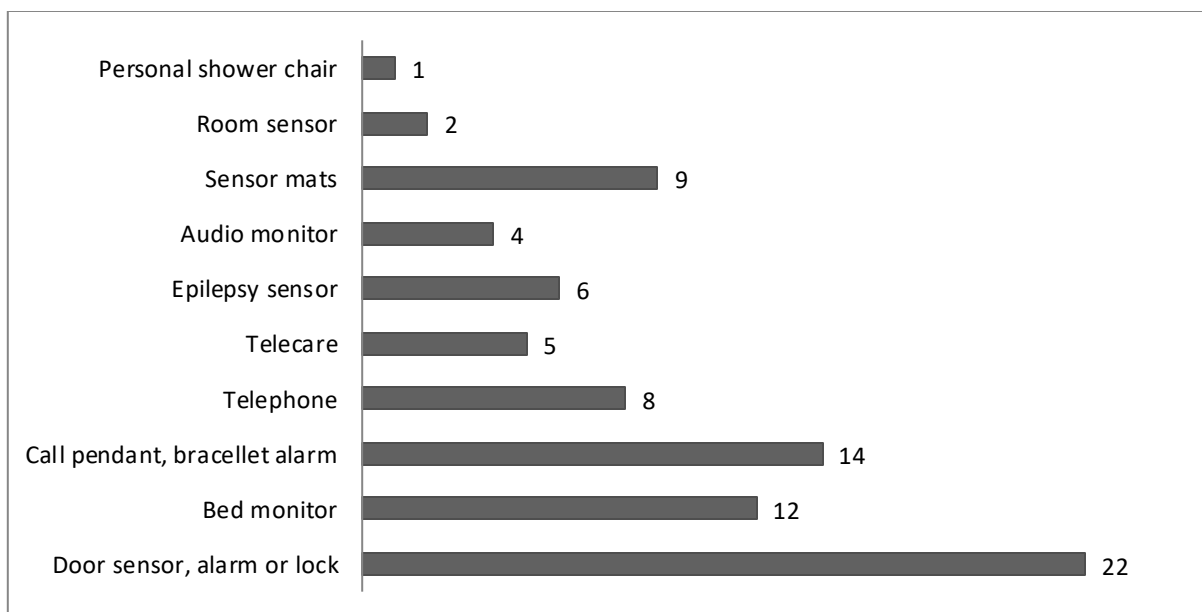
Figure S2: Reported use of assistive technology at baseline

Ten referred to branded systems or services where it was unclear what assistive technology was being used. Twelve mentioned Just Checking itself. For 325 tenants the response was 'none', or 'not applicable', or equivalent phrases.

As in the baseline survey, follow up survey respondents varied in how they interpreted the question on assistive technology. The majority (93.7%) either did not answer the question or considered it not applicable to the tenant concerned, or referred to 'There is no plan for assistive technology at present'. Some respondents referred to the use of assistive technology as 'to be reviewed as part of assessment process'. There was occasional reference to changes that already had been made: 'We have already installed bed and chair alarms to alert us of his movements as he is at risk of falling.'

Relationship between baseline needs and identified changes

The surveys found no clear relationship between specific needs of individuals and the ability to identify potential changes to care. Generally the ability to identify changes for each condition ranged between 16 and 22 percent with two exceptions (need to be turned regularly and risk of sexual offending). Table S2 sets out the number of cases where potential changes were, or were not identified, and number of AWLDs lost at follow up. It should be noted while overall the study achieved a reasonable sized sample, the number of individuals with each need limits the ability to draw any statistical conclusions. Also, some service users had multiple needs.

Table S2: Relationship between needs identified at baseline and identification of potential changes

Identified need at baseline	Potential changes	No potential changes	No follow up data	Total
Needs turning regularly	3	4	0	7
	(42.9%)	(57.19%)		
Night seizures	9	31	3	43
	(22.5%)	(77.5%		
Challenging behaviours	34	124	14	172
	(20.8%)	(71.1%)		
Incontinence	24	88	11	123
	(21.4%	(78.6%)		
Epilepsy	16	61	6	83
	(20.7%)	(79.3%)		
Falls	16	64	4	84
	(20.0%)	(80.0%)		
Disturbed sleep	29	116	12	157
	(20.0%)	(80.0%)		
Anxiety and distress	48	191	26	265
	(20.8%	(69.2%)		
Requires personal care and physical support	43	189	18	250
	(18.5%)	(71.5%)		
Personal safety	40	206	19	265
	(16.2%)	(83.8%)		
Sexual offending	1	10	1	12
	(10.0%)	(90.0%)		

Supporting quotes for analysis of focus groups and open questions in online surveys

Objective data to make decisions	Better information	'Clear picture of how people live their lives when support is not there' (Care Manager LA6) 'We have to take people's word for what they say do and don't do, and they can give the answer they think we want to hear. I think our service users are the same - they don't want to come across as 'well I can't do that I need help, or I can manage quite well thank you'. This gives us a true, a better picture without us coming up with an idea like 'we'll come and sit with you for 24 hours'.(Care Manager, Focus Group)
	Client movements	The equipment has enabled us to see that the person being supported does not sleep at night and at times leaves their home late at night. This has resulted in a need to reassess their support requirements. (Care Manager LA7)
	Use of accommodation	The individual uses his kitchen and lounge most of the time and that has not changed in any significant way.' (Care Manager LA9) and 'Client only uses downstairs part of the building and sleeps through the night.' (Care Manager LA2)
	Medication review	This person has got some medication reviews coming up before we would need to monitor before we changed any support in service.' (Care Manger LA2) 'This is particularly helpful as this person has a heart condition. It is interesting to know if he has had a restless night and used to monitor sleep patterns to support care of health needs'. (Care Manager LA8)
	Unknown issues	'Highlighted how people sleep – had one person who does not sleep well – this was not known.' (Care Manger LA5) It alerted me to level of activity in the evenings and has indicated that the person is being over-supported after 9pm at night.' (Care Manger LA8)
	Identified over care	'Enabled the person we support to identify that he no longer needs all of his sleep-ins.' (Care Manager LA7) 'We have identified that the sleep in is not being utilised during the night we have also identified that the person is over supported after 8pm in the evening and are looking at reducing support.' (Care Manager LA8)
	Increase support	The Just Checking identified that the individual was spending a long period of time alone in his property. This allowed us to increase his hours in order to support the individual to access the community.' (Care Manager, LA3)
	Verified staff accounts	'Found useful to look at activities that were logged and if they actually happened and how evidenced.' (Care Manager LA6)
Person centred care	Reconfiguration of support	'Delivering the right amount of support in a person centred way'. (Care Manager, Focus Group) 'I think it turns the whole issue of care management on its head really, because your starting point is 'what are people's abilities' rather than what they can't do. So you're looking at what their abilities are what they want to do for themselves and then you're building around that' (Care Manager, Focus Group)
	Better use of resources	'quality of support not the quantity' (Care Manager, Focus Group)

		'I think from our perspective we are the budget holders so it's a bit about looking to see how far we can stretch that limited budget so that we can provide support to as many people as possible. And it's about making sure people are having just enough support, so that it frees up agencies to be able to offer up support to many more people.' (Commissioner, Baseline Focus Group) *'It's going to help us to assess what people actually need and give us confidence to remove things/support that people actually don't need, or give us evidence actually keep support that people do need.'* (Care provider, Baseline Focus Group) *'from a care perspective, obviously there is a cause for increasing independence and choice etc for service users but from - touching on the budget - I think for us it's about hopefully using existing resources so that they're stretched a lot further so that we do actually support more people'* (Local Authority Official, Baseline Focus Group)
	Person centred care planning	*Updated support plans to reflect the support required.'* (Care Provider representative, Focus Group) *'Introduced personalised care plan for X to accommodate his changing needs.'* (Care Manager, LA5)
	Made changes	*'Changed support at night to reflect better understanding of needs'* (Care Manager LA7) *'Using the systems, we were able to see that the person supported was not using their staff at certain times of the day so after consulting with the individual and care team we were able to move the shifts to support his lifestyle and personal development.'* (Care Manager LA5) *'We noted that Sunday hours were not being fully used as this lady was eager to spend time with mum. We took the hours from Sunday, freeing her to visit mum when she wanted, reducing the anxiety felt and used them on Wednesday to provide 4 hours for a leisure pursuit.'* (Care Manager LA2)
Providing reassurance on existing and planned care packages	Confirmation	*'It has evidenced that the support is needed, as staff are worried about service users' safety if not supported with sleep-in support.'* (Care Provider representative, Focus Group) *'Continually providing reassurance to both customers and staff'* (Care Provider representative, Focus Group)
Sense of surveillance	Perceived threat / reassuring staff	*'Giving information to reassure staff'* (Care Provider representative, Focus Group) *'Discussed with staff & advised we waiting for final analysis'* (Care Provider representative, Focus Group) *'Not big brother'* (Care Provider representative, Focus Group) *'Movement sensor only'* (Care Provider representative, Focus Group) *'For service user benefit not spying on staff.'* (Care Provider representative, Focus Group)
Keeping people safe / safeguarding		*'Through the night time patterns of movement and the ability to check that X behaviour did not have an impact on safety - in fact there was no behaviour of concern at night reported following the system being installed.'* (Care Manager, LA4)

Group dynamics		*'develop a more creative and flexible service'* that leads to *'better group dynamics in the supported environment' [By] …filling in the gaps and grey areas a more holistic care environment can be created.'*(Care provider representative, baseline focus group, LA3)
Culture change	Dependency	*developing alternative ways of giving positive support to individuals and developing their independence'* (Baseline focus group)
	Risk aversion	*'It's evidence to back up some more positive risk taking, really, because at the moment we have to risk assess everything and you have to err on the side of caution but this kind of technology will hopefully give us that accurate …that pin-point on what are people doing, what's the time, what exactly do they need so it will help us to implement that positive risk taking'*(Care Provider representative, Focus Group)
	Challenge	*Managers encountered situations where staff responding defensively to data that was inconsistent with their reports on users.'* (Care Provider representative, Focus Group)
Organisational reputation		*'It gives you the opportunity to dissect in every area that needs an assessment, because if you get the assessment right in the first place and get that across you'll be able to give continuity to the service user - and the story will carry on hopefully the service user will be happy with what they are getting, and the council are getting value for money as well'* (Care provider representative, baseline focus group)
Acceptance of JR approach	Openness	*Seeing what can change, be done. Looking at what care is required.'*(Care manager, Focus Group)
	Involving stakeholders	*'Meeting with families and users to address concerns'*(Care Provider representative, Focus Group) *'Working in partnership with families and staff to support with understanding of the benefits of the trial'*(Care Provider representative, Focus Group) *'Meetings between family and staff to review user's needs'*(Care Provider representative, Focus Group) *'Staff on board before project starts'* (Care Provider representative, Focus Group) *'Getting service users to help with the installation'*(Care Provider representative, Focus Group)
	Communication	*The importance of good communication could not be underestimated'*(Care Provider representative, Focus Group) *'Good communication was important but there are still reservations around reason the equipment is here'* (Care Provider representative, Focus Group) *'Explained about the sensors evidencing need … works both ways'*(Care Provider representative, Focus Group)
Understanding how best to use the equipment		*'Removal of sensors where privacy is required'*(Care Provider representative, Focus Group) *'Moved and replaced sensors to provide better/accurate readings '*(Care Provider representative, Focus Group) *'After a while they forget the sensors are there'*(Care Provider representative, Focus Group)
Consent	Accepting tenants choice	*Accepting that it is the user's choice on whether to install equipment in their home or room and they can be capable of making that decision'.* (Care Provider representative, Focus Group)

		Some families have refused on behalf of sons/daughters (Care Provider representative, Focus Group)
Local authority engagement		*'Rolling out and future use in the local authority will involve responding to the attitudes of other professionals who may have a different perspective to providers and response to the information provided by Just Right, in particular social workers.'*
Assistive technology	Awareness and availability of AT	*'SU is epileptic and depends on appropriate assistive technology being available'.* (Care Manager, LA5) *'Review wake night data, look at incident forms to ensure there are no potential issues and we need to look at assistive technology to help support us.'* (Care Manager LA8)
	Use	*Removal of waking night staff and replaced with epilepsy sensor* (Care Manager, LA4)
Need for case studies and guidance		*' Develop positive stories around how JC has helped to improve service user independence', particularly for those with complex needs* (Care Provider representative, Focus Group)
Community engagement		*'Balancing community engagement with the needs and support required by users' by allowing resources within care packages to be reorganised.'* (Care Provider representative, Focus Group)
Continued monitoring		*'Once the pilot has completed may not always have the resources to interpret the data.'* (Care Provider representative, Focus Group) *'Consistently review the situation using information provided by Just Right so are able to be responsive to changing needs'.* (Care Provider representative, Focus Group) *'How best to incorporate Just Right into existing reviews procedures'* (Care Provider representative, Focus Group)
Importance of external support		*(OT) 'Very helpful and very responsive – understands system in practice.'* (Care Provider representative, Focus Group)
Reasons for not making changes	Contract requirements	*We are required to deliver the level required by council* (Care Manager LA6) *We are required to deliver the set hours support* (Care Manager LA6)
	Need more information	*It did not give us much information as the equipment had to be withdrawn'* (Care Manager LA9) *'We still have irregular patterns for that individual and our assessments show no pattern as of yet.' (Care Manager LA3)*
	Service user resistance	*'X refused to have the Just Checking equipment installed'* (Care Manager LA9) *'Service user didn't like sensor in room'* (Care Manager LA6)
	Anxious about change	*'Tenant is fairly anxious at the moment about another tenants moving into the property with him. There was a tenant due to move in but the plans fell through. This could be something that could be looked into when the tenant is more settled.'* (Care Manager LA8) *'Service user lives alone and already spends some time on his own. He is anxious at the support he receives being lowered. He will not answer the door to anyone but also will not answer the phone to anyone and communicate in any way.'* (Care Manager LA8)
	Vulnerable	*Service user is a vulnerable adult there would be risk to him spending any further time by himself than he already does. 'The other service users' needs that he shares with needs have changed and the risk would be too great for them to spend any time alone.'* (Care Manager LA8)

		'The service user is vulnerable to being exploited by others. There would be risks surrounding the household environment if left alone'. (Care Manager LA8)
	Shared accommodation	*'Tenant is living in shared accommodation and the current package meets their needs.'* (Care Manger LA2)
	Already independent	*'Customer likes to remain as independent as possible and level of care is sufficient.'* (Care Manager LA3) *'Service user does not have a high level of support and the support he does receive are at key points of the day that are needed.'* (Care Manager LA8)
	Staffing	*'The level of support was affected by staffing availability throughout the process due to recruitment and sickness'* (Care Manager LA4) *'The system was in use at a time period of staff deficits, so support had to be rearranged to provide the service - recruitment and sickness the main blockages.'* (Care Manager LA4)
	Need to consult	*'Approval from LA to change the funding agreement currently in place'* (Care Manger LA2) *'Refer back to LA regarding funding and submit our findings from Just Checking.'* (Care Manager LA9) *'For commissioning services to recognise our findings and agree a reduction in hours.'* (Care Manager LA2)
	Risk assessment	Ensure risk assessments are discussed and signed off by everyone involved.' (Care Manager LA5) *'We will need to have a robust risk assessment and protocol in place if he was to be left for any period of time.'* (Care Manager LA8)
Outcomes	Identification of change	*Change of accommodation and support package.'* (Care Manager LA6) *'Change of accommodation. JC will help ensure this level of support is right for this person.'* (Care Manager LA6)
	Supporting move to independent living	*'Confirmed that the individual was ready for a more independent setting'* (Care Manager LA9) *'Enabled the person we support to become more independent around the home.'* (Care Manager LA9) *'Service user moving into single occupancy'* (Care Manager LA2)
	Improved quality of life Improved sleep	*The data indicated that the person was having a very disrupted sleep. This lead to staff taking him to GP. The person has been prescribed sleep medication and has had a very positive impact on the person.' (Care Manager LA2)* *'Better sleep – better quality of life* (Care Provider representative, Focus Group) *'There hasn't been a change in the support package received; there has been a change in medication. The sensors highlighted X was awake most of the night which was causing behaviours the following day, this then triggered agitation which was believed she was a risk to the public, to ensure free from danger, and she was not supported out whilst very agitated into the community. The sensors highlighted she was up and awake most of the night in her bedroom, she closes her door of a night too, when it was highlighted the*

		doctor prescribed sleeping tablets and changed her medication. She is a lot more calmer and now receiving correct support out in the community safely.(Care Manager LA6)