# Report on the medicines improvement project

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## Summary

The Care Inspectorate's vision is that every person in Scotland receives high-quality, safe and compassionate care from care services that are continually improving. The management of medicines in care homes for older people, and its effect on resident's health and welfare, remains a concern for us.

We have a role in the quality assurance of care services, and the identification and promotion of good practice.

In support of our vision and with the help of Scottish Care, we undertook a project with 10 care homes, aiming to reduce medicines issues using quality improvement tools.

The care homes' commitment to improve was reflected in their positive relationships with each other and the Care Inspectorate. All homes embraced the use of data over time to drive forward behavioural and system change, and most homes reduced defined medicines issues by a significant amount, despite the interrupted nature of the project. The interventions used to achieve this should offer a good starting point for any homes looking to improve their handling of medicines to support residents' health and wellbeing.

Elements of the framework used in this project may also offer benefits to both the sector and us as the regulator in the post Covid-19 scrutiny landscape.

## Rationale

Medicines are the most common form of health care intervention, yet the medicine process is often prone to error.

While most individual errors do not lead to harm, the system-wide scope and cost (welfare and financial) of medication errors is well known[1, 2]. In particular, care homes cover fewer people than the other sectors, but have the highest error rates per person[2].

Increasing frailty, two or more medical conditions and many prescribed medicines make older people in care homes particularly susceptible to the adverse effects of poor medicines management, with a resultant negative impact on their health and welfare.

The World Health Organization recently called for an ambitious 50% reduction in medication incidents[3].

The Care Inspectorate (CI) has a general duty under the Public Services Reform (Scotland) Act 2010 to further improvement in the quality of social services.

1. Kohn LT, Corrigan JM, Donaldson MS, editors. To err is human: building a safer health system. Washington, DC: National Academy Press, Institute of Medicine; 1999.
2. Prevalence and Economic Burden of Medication Errors in the NHS in England, 2018. www.eepru.org.uk/wp-content/.../2018/02/eepru-report-medication-error-feb-2018.pdf
3. WHO launches global effort to halve medication-related errors in 5 years. http://www.who.int/mediacentre/news/releases/2017/medication-related-errors/en/

## Project aim and scope

The aim of this project was a 50% reduction in defined medication incidents in participating care homes for older people. The project start date was September 2019 and was to last until 31 December 2020 however, as we outline later, COVID-19 shortened the project duration. The project also tested the use of quality improvement tools to improve the recording and administration of medicines in the care homes.

We invited 10 care homes for older people with an evaluation of adequate (grade 3) for care and support at the most recent inspection report, as homes with room for improvement in medication management but without pressing regulatory concerns. We looked at complaints and controlled drug notification data to help us find the right care homes for the project.

In care homes for older people, upheld complaints about medication are the fourth most common type of complaint we receive (6.5%), behind general health and welfare (23.3%), staffing levels (9%) and communication (7.2%). Over a quarter of complaints come from five main care providers[4].

Data on controlled drug notifications also identified those providers with a higher rate of notifications, with some overlap between the two lists. (See appendix 1 for examples of controlled drug notifications).

4. Complaints about care services in Scotland, 2015/16 to 2018/19, July 2019

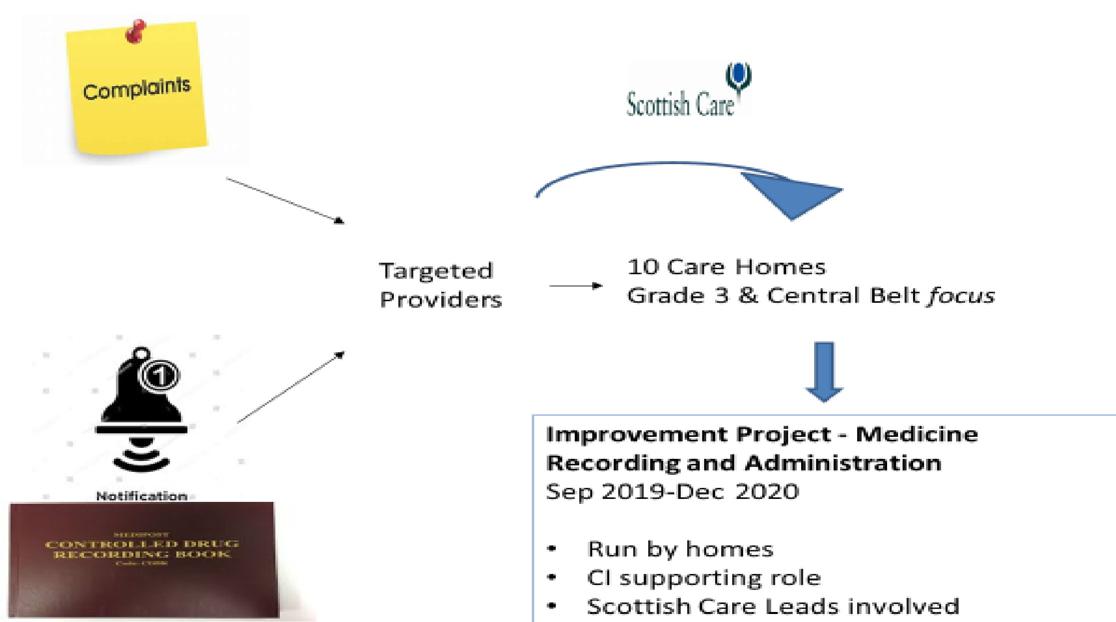
https://www.careinspectorate.com/images/Complaints_Statistical_Bulletin_2018-19.pdf

From the combined complaints and notification list and homes suggested by our inspectors, we were able to identify an initial short list of 14 homes with an evaluation of adequate at their most recent inspection report. For logistical reasons, we focused on homes in the central region (Glasgow, Stirling and Dundee).

Scottish Care regional leads were involved in getting buy-in from homes for the project. Twelve of the 14 homes agreed to take part and were invited to a project launch event. However, two homes pulled out, one had a new improvement notice in

a variety of care areas, and one cited workload pressures.  A summary of the project scope is given in figure 1 below.

**Figure 1:  Summary of project scope**




Before we launched the project, we visited nine of the 10 homes for an initial discussion on the project principles, which were that the project would be driven by the homes themselves, with our improvement adviser (previously pharmacy adviser) offering regular quality improvement and medication management advice and support.  These visits also allowed us to look at their medication systems and share ideas for improvement.  The homes also had a Scottish Care lead to offer any help as needed, and it was agreed that the Care Inspectorate inspector for each service would periodically check in with the service during the project.

## Project structure

We invited each of the homes involved to attend a launch event (Learning Session 1) in September 2019 to cover the principles of both running a quality improvement project and reducing medication errors and incidents in care homes (later referred to as medicines issues as requested by the homes involved).  To reduce medicines issues, we used an approach based on human factors and systems that is commonly used in the patient safety movement.

The launch covered the principles of the model for improvement (MFI) and the use of the following quality improvement tools.

1. A project charter – to agree the project's aim, scope within the home, and participants.
2. Driver diagrams – to focus ideas for change and activity.
3. PDSA (plan, do, study, act) cycles – to test out changes and help learning.
4. Data-over-time charts (for example run charts) – to measure the effect of changes.

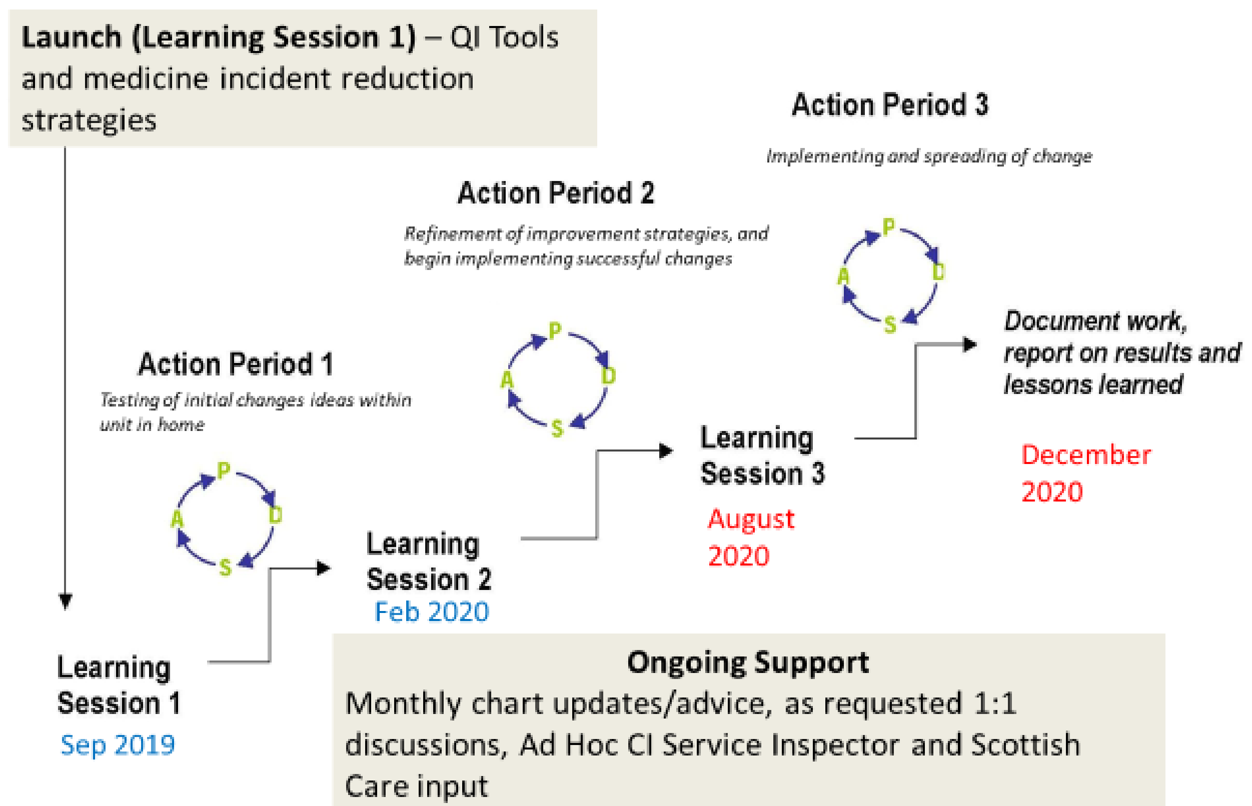
Each home had an agreed and consistent definition of medication issues for measurement purposes. For example, if a medicine was prescribed twice a day and was not given as intended for three days, this was recorded as six individual issues.

Examples of medicine issues included:

- medicines not given because they were out of stock
- gaps in the administration and recording of medicines
- regular medicines not given as prescribed or intended.

We gave homes a recording sheet measure data weekly, help with ongoing analysis of issues and target improvement activity. We advised homes to focus initial improvement activity on one unit in the home only, in line with quality improvement (QI) principles.

**Figure 2: Proposed workplan for the project**



Following the launch, homes submitted baseline data obtained from (in many cases archived) medicine records. This allowed us to create charts of data over time for each home. Homes were to then use quality improvement tools to focus their improvement activity. Homes submitted their ongoing data to us every four weeks in most cases, eight-weekly in others, with updated charts returned to the home by our improvement adviser along with any medicine management or improvement advice, if needed.

Learning Session 2, early in February 2020, was organised using Microsoft Teams. This session shared initial lessons learned between the homes.

Action Period 2 was intended to allow refinement and embedding of improvements, and Learning Session 3 aimed to cover implementing and spreading change during Action Period 3.

Shortly after Learning Session 2, COVID-19 significantly impacted care homes across Scotland. Given the impact and pressures of COVID-19 on the sector, we decided to end the project early, in June 2020.

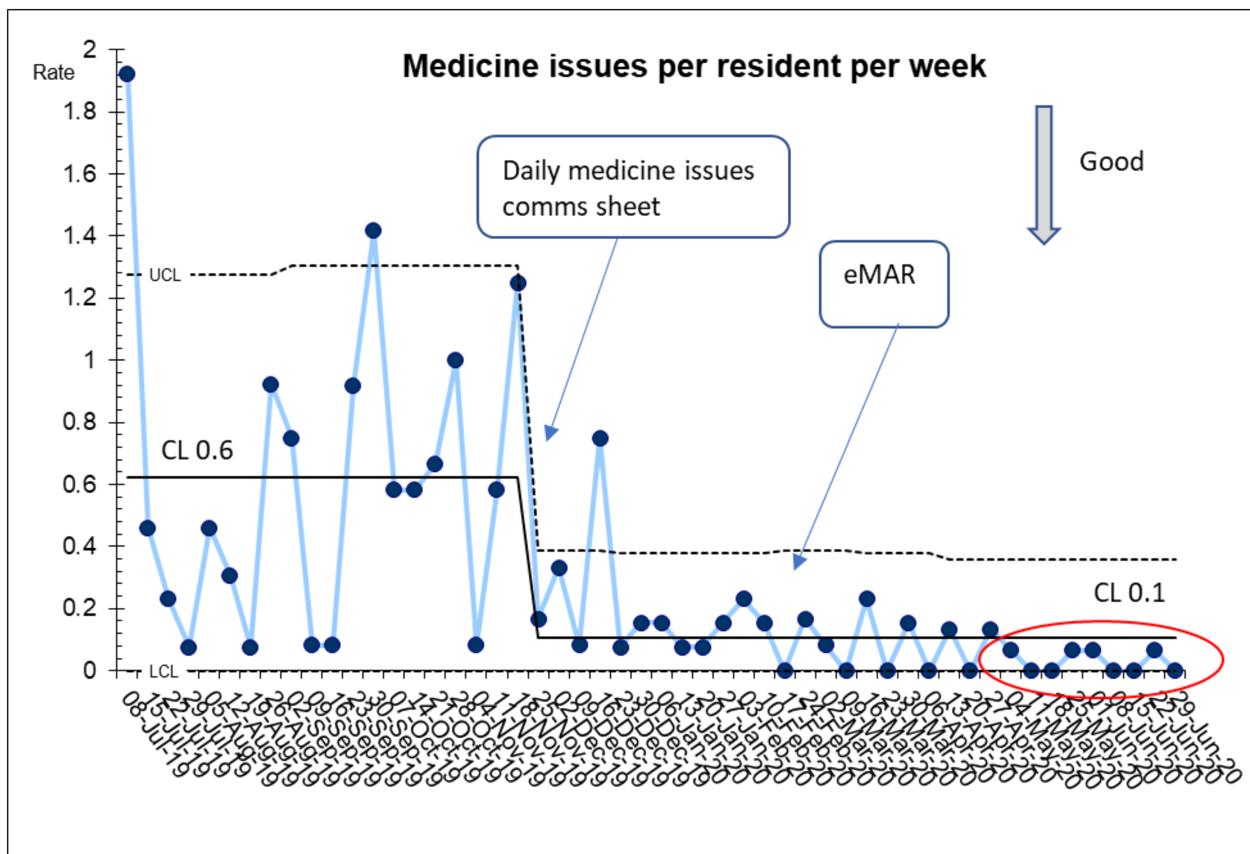
## How we evaluated the project

The measures we took to evaluate the success of homes in adopting the quality improvement tools and reducing medicines issues are detailed in the outputs and outcomes section of the project logic model (appendix 2) and in the following results sections.

## Results

**Care Home 1**

Care Home 1 is a large (70-80 bed) care home, part of a UK-wide chain. Over the course of the project, medicines issues were reduced from a baseline mean of 0.6 issues per resident per week to a mean of 0.1 in the second phase of their project. This is a reduction of nearly 85%. We noted further improvements at the end of the project in June (circled in red on the graph below).




Staff in the care homes said the introduction of a daily medicine issues communication sheet helped them resolve issues quicker. For example, previously, if a resident was out of stock of a medicine this may not have been picked up and resolved for a few days but now, the medicine communications sheet placed at the front of the medicine charts had to be signed off at end of each shift and this allowed these issues to be identified and resolved quicker, with resultant improvement in resident wellbeing.

Further improvements were made by introducing electronic medicines administration recording (eMAR). This was introduced in mid-February. The eMAR system can reduce recording and administration issues by prompting staff when medicines are due to be given (with added safeguards to ensure the correct medicine is given to the correct person). It can also allow rapid alert to any issues such as out of stock medicines. In the last nine weeks of the project, only four individual issues were reported in total. Staff reported the eMAR system was easy to use.

Staff feedback on the project included the following comments:

*"The initial face to face meeting prior to launch was helpful to get feel for project. The launch attended by all the care homes was very helpful to consolidate the learning without any interruptions. It was also good to see the other homes in the*

*"The use of data-over-time charts were the most useful tool, they allowed us to see the effect of changes as they happened and moved things along."*

*"Strong ongoing support from David. Occasional emails from Scottish Care leads but no practical support really needed from them. Our inspector changed half-way through due to COVID-19. Both were very good at checking in… and would occasionally ask about progress in the*

*"This project AND the weekly check ins by the inspector during COVID-19 have really personalised relationships with CI staff, and we feel this is of tremendous benefit. Makes contact with CI less stressful."*

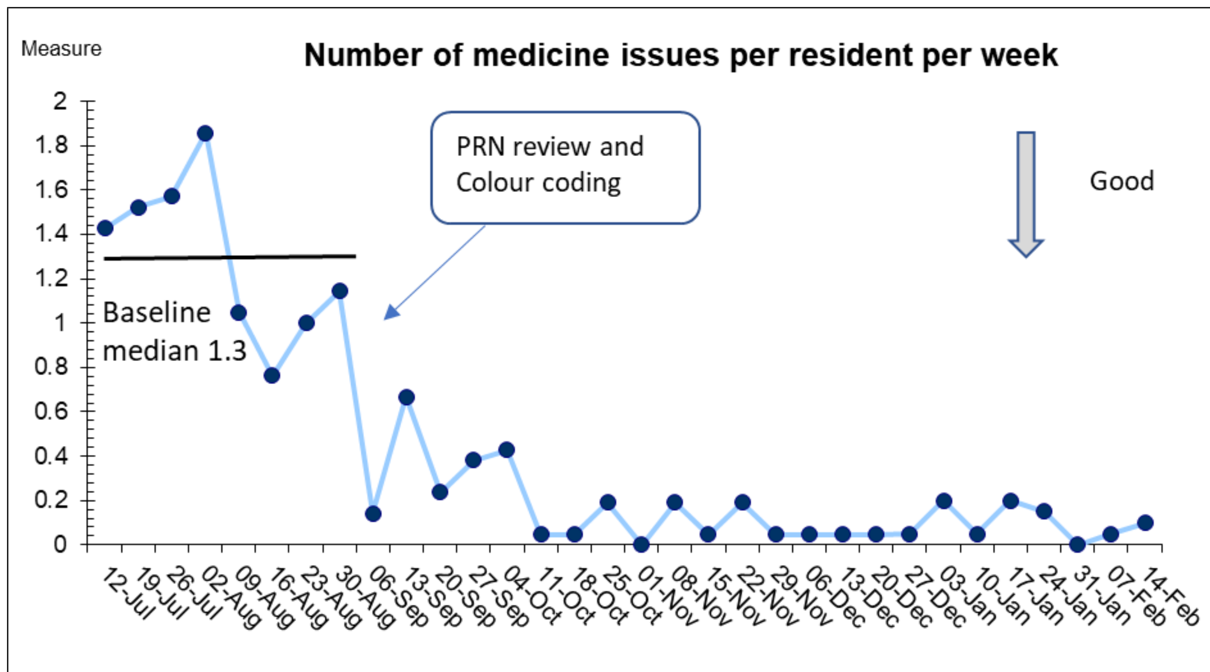
**Care Home 2**

Care Home 2 is a large (70-80 bed) care home, part of a large UK-wide chain. The home tried two interventions at the start of the project.

Prior to the project, when a PRN (taken when required) medicine was given, staff did not always remember to review and record the effectiveness of this. Staff agreed a new procedure where after administration the medicine administration recording (MAR) chart sheet was left sticking out of the MAR folder to act as a reminder for staff to assess and record the effectiveness of the medicine. This proved to be effective and of benefit for residents. For example, the new procedure identified that for one resident, her pain medicine was not being effective. As a result, staff alerted the GP for a review and the resident was placed on a different pain medicine which has since proved to be effective.

Analysis of the medication system at the start of the project identified an issue with agency staff making mistakes with the evening dose of a psychoactive medicine for a resident. Despite clear instructions on the MAR for a dose of one tablet during the day and a half a tablet at night, agency staff often gave one tablet in the evening as well as one during the day. This overdose meant the resident was often more drowsy than normal. Colour coding the day and evening doses on the MAR to highlight the differences appeared to work well in that there was no more overdosing and the resident was less drowsy.

The rate of medicine issues reduced from a baseline median of 1.3 at the start of the project to a median of 0.05 over the last four months; a reduction of over 95%.

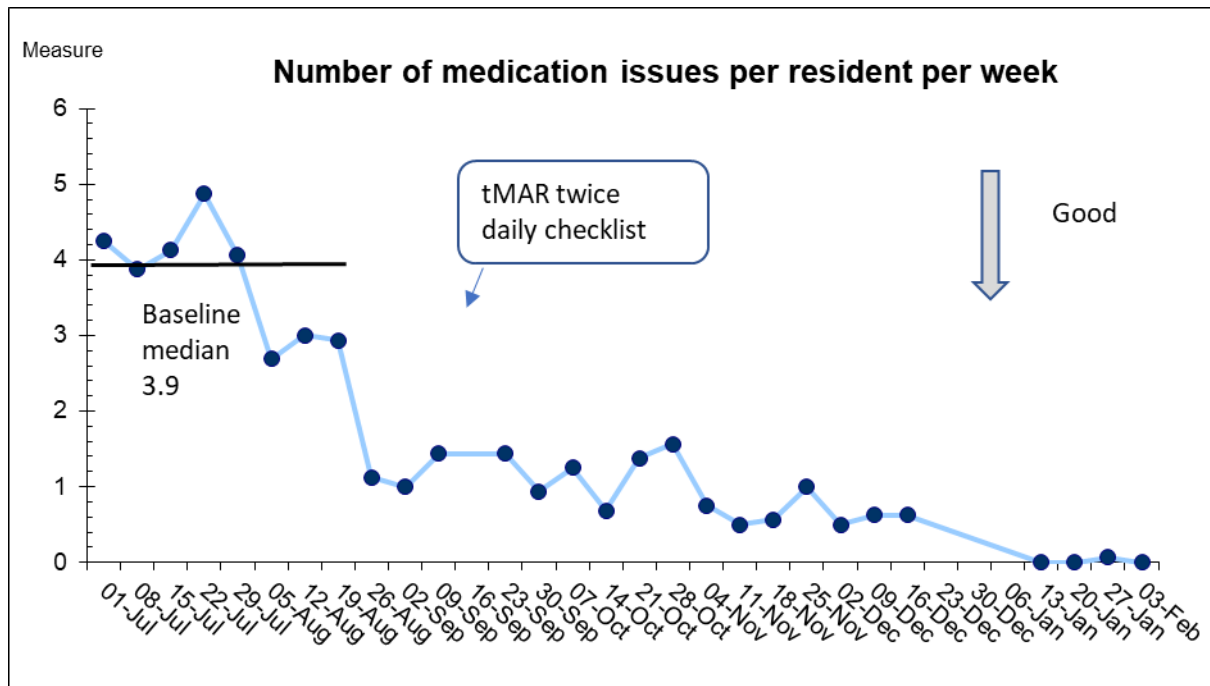



Staff feedback on the project included support for the use of data over time. This inspired the manager to use this tool to look at the effect of changes to lunchtime arrangements on residents' weight.

*"Really enjoyed the project, found it very interesting. Well supported by David and good regular contact with inspector by*

The manager also voiced support for expanding the project to other homes in the chain (assuming continued Care Inspectorate support) and would be keen to be involved in this.

**Care Home 3**




Care home 3 is a large (90-100 bed) independent care home. The home was not able to attend the launch in September 2019 but our improvement adviser visited prior to the launch. At this time, the management of general medication was stable (following recent regulatory input and work done by the home) so the project focused on improving the recording of topical medicines such as creams and ointments on the topical medicines administration recording (tMAR) chart.

The home introduced a twice-daily checklist for the recording of medicines administration which improved the recording. Over the course of the project, the recording improved from a baseline median of 3.9 issues per resident per week to a value of 0.3 for an equivalent period at the end of the project. This is a reduction of over 92%.

As the project focused mainly on improving recording of creams, mostly emollients, there was no significant impact on residents. However, the manager reported that there was impact on staff.

> *"Weeks after the twice-daily checks were instigated, staff started to pull more together as a team, team spirit improved… staff enjoyed the project*

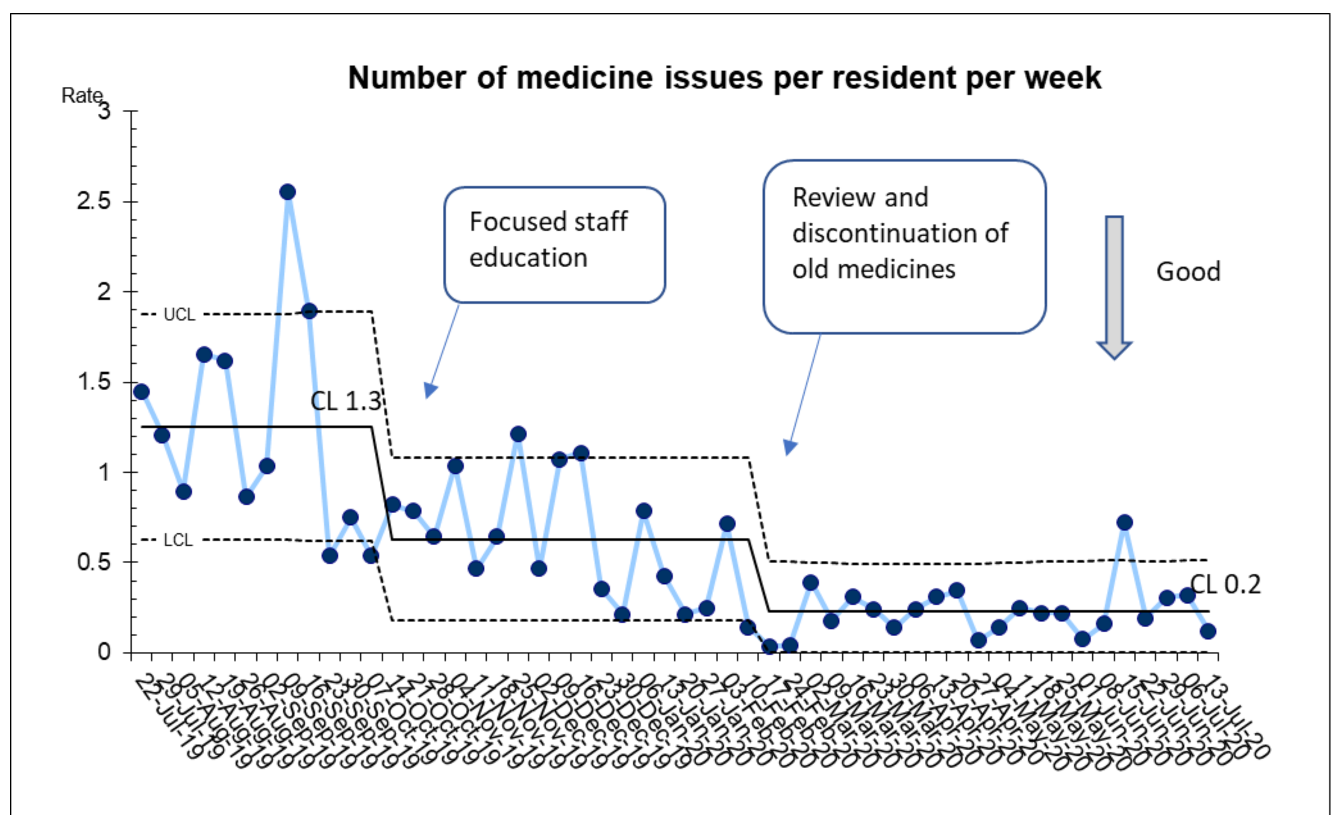
The manager also commented:

*"Regular email and phone check contact from the inspector was very helpful."*

*"The visit by the CI pharmacy adviser before the project launch was very helpful in diagnosing where we should focus our activity."*

**Care Home 4**

Care Home 4 is a 50-60 bed facility that is part of part of a large UK-wide chain. Over the course of the project, medicines issues were reduced from a baseline mean of 1.3 issues per resident per week to a mean of 0.2 at the end of the project. This is a reduction of just over 85%.




Analysis of the baseline medication system in the home identified issues with recording of creams and PRN (taken when required) medicines (similar to homes 2 and 3 above respectively).

The first intervention tried was a programme of focused one-to-one education, which included information on the correct recording of medicines and a booklet for each

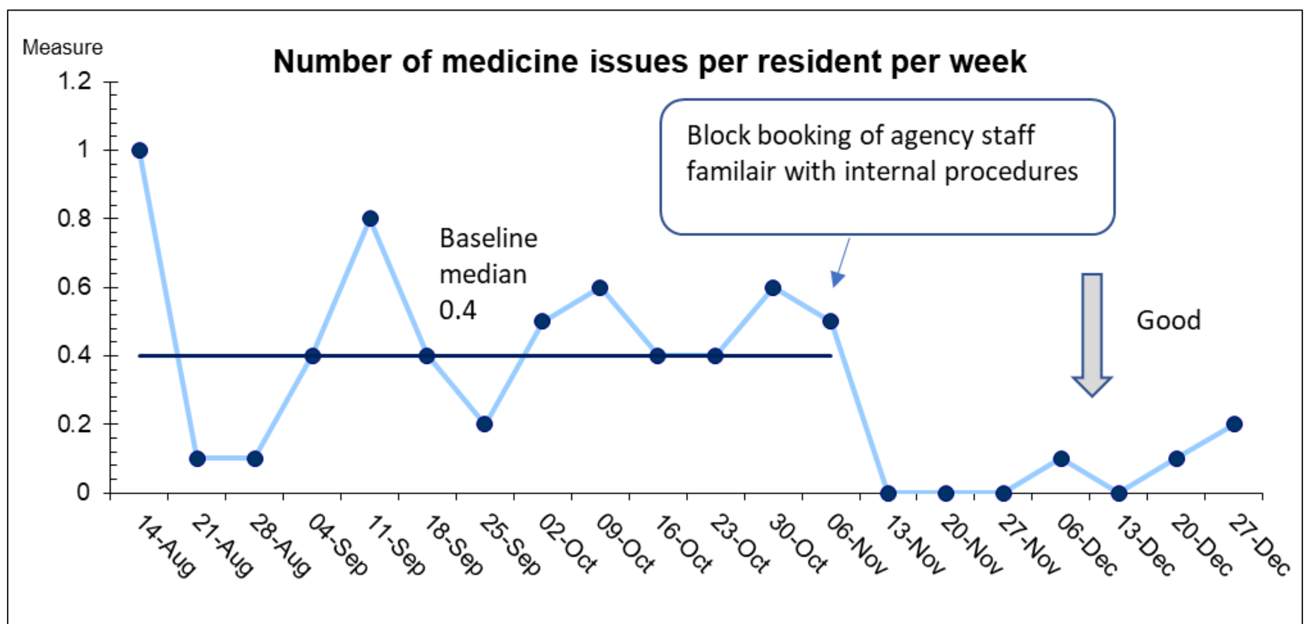
member of staff on key medicines, what they were used for, common doses and so on.

Another identified issue was that each resident's MAR chart contained many pages of medicines, making the recording and administration of medicines more time consuming and difficult. The second intervention was a review of the MAR charts to identify medicines that were no longer needed and could be removed. This process involved liaison with the community pharmacy supplying the MAR charts.

The home gave positive feedback on the project. The home indicated they would be happy to participate in another such project.

*"Staff enjoyed the focus that the project brought… good support from the inspector and improvement adviser."*

### Care Home 5

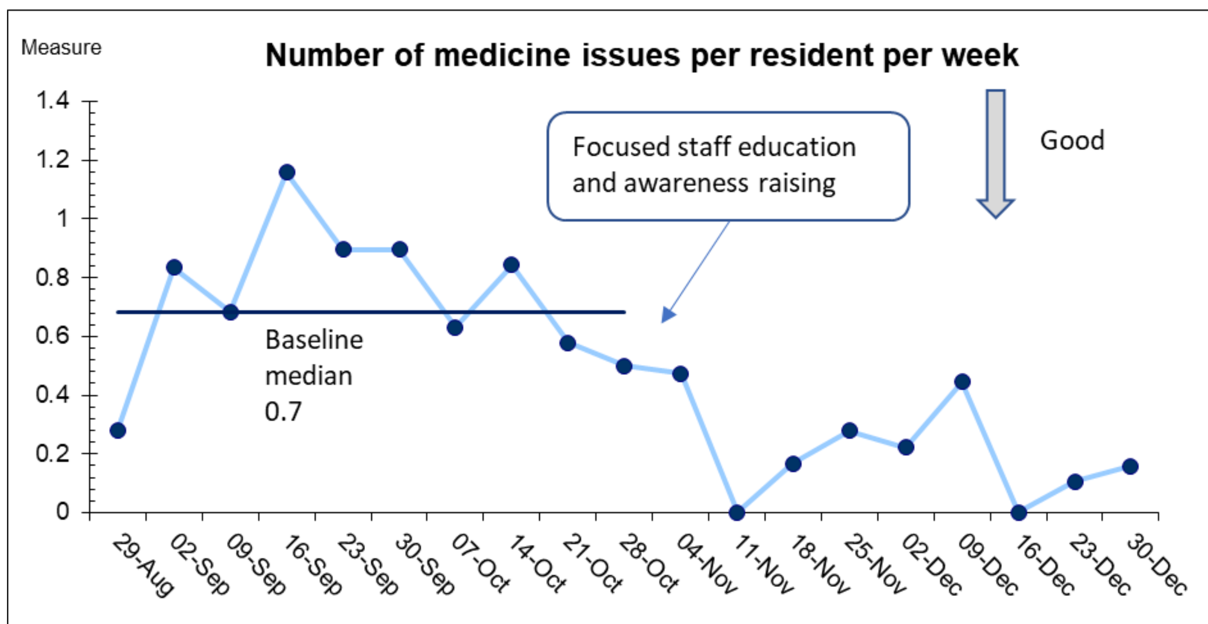



Care home 5 is a large (80-90 bed) care home part of a large UK-wide chain. Before the improvement project, the joint efforts of the inspector and home had improved much of the medicine management in the home. However, further analysis revealed a pattern of issues (missed signatures and erroneous medication counts) related to the use of agency staff unfamiliar with internal procedures, particularly the check-in of monthly medicines. Block booking of agency staff familiar with the systems reduced issues from a baseline median of 0.4 issues per resident per week to a

value of 0.05 for the last six weeks of the project; a reduction of 87%. The manager felt that raised awareness of medicines handling as a result of the project, had some effect in the improvement.

The manager of the home at the start of the project moved to work in another home in February 2020.

**Care Home 6**




Care Home 6 is a large (110-120 bed) care home, part of a UK-wide chain. The home had a baseline median of 0.7 issues per resident per week. The home found the data collection sheet a useful tool to analyse the common types of issues, and so focused staff training and awareness raising at team meetings. The median level of issues per resident per week for the last eight weeks of data submitted was 0.16; a reduction of just over 77% on baseline.

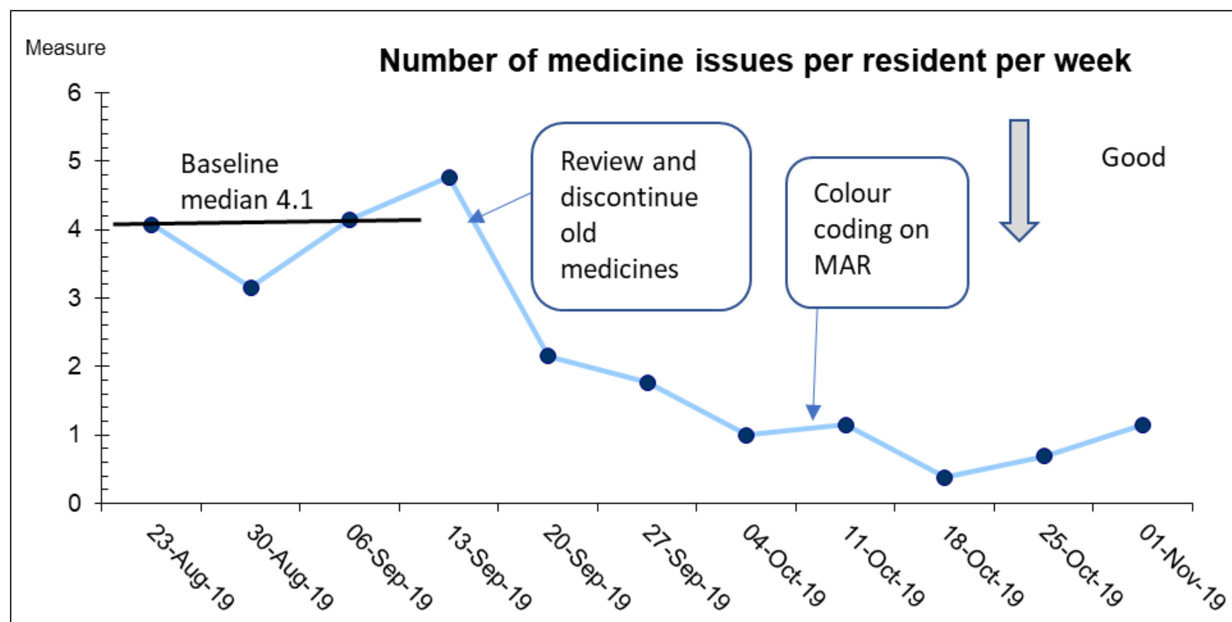
The clinical services manager from the home commented that there was no negative impact on staff throughout the project and that they felt well supported.

*"All we had to do was collect data, other input was provided by David. Very straight forward for us."*

The manager of the home at the start of the project moved to work in another home in February 2020.

**Care Home 7**

Care Home 7 is a large (100-110 bed) care home, part of a large UK-wide chain. The home submitted four weeks of baseline data only, with a median of 4.1 issues per resident per week. A review and tidying up of the MAR chart (for example removal of discontinued medicines) reduced medicine recording and administration issues. Colour coding the MAR chart administration times did not appear to have any effect in this instance. Over the last four weeks of submitted data the median was 0.9, a reduction of 78% from baseline.

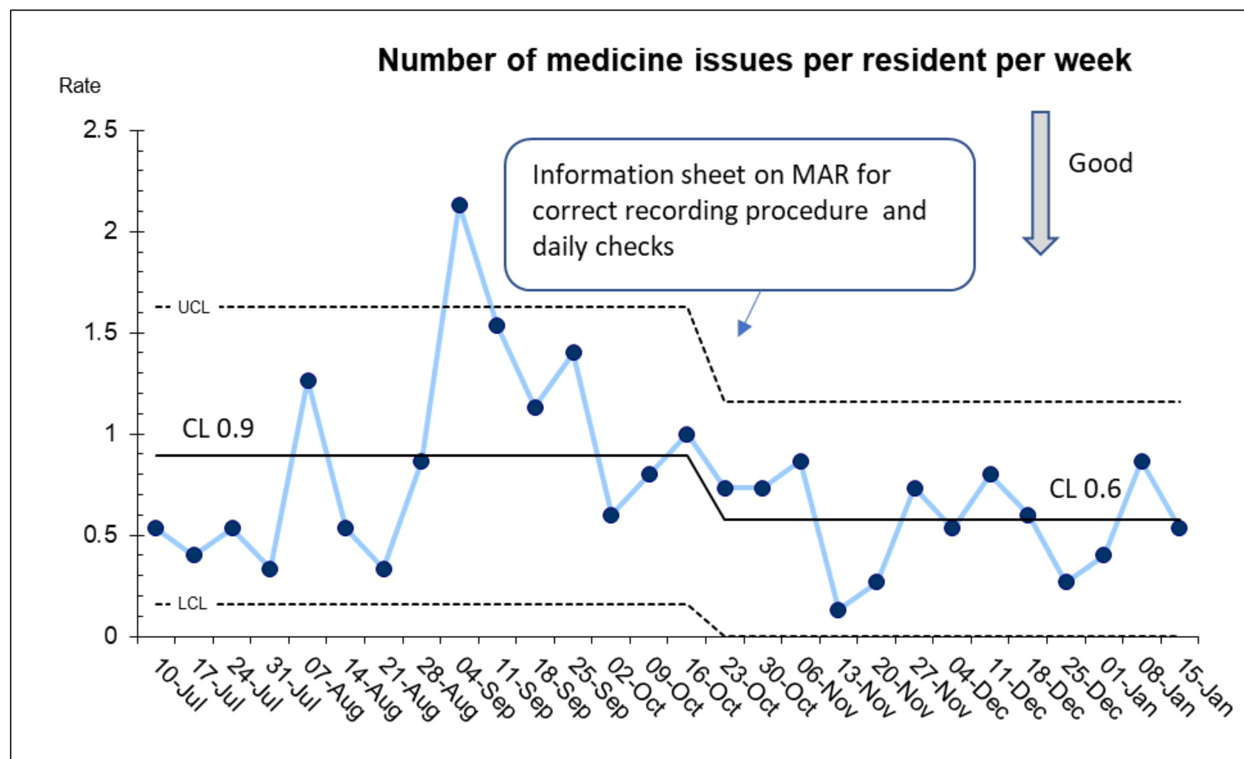



The deputy manager commented as follows on the impact of the project on staff.

*"We reviewed the medicines charts and found items that were no longer needed. For example, some people were prescribed 2-3 creams that did the same job. By tidying up the MAR charts it meant that staff were no longer wading through pages and pages for each resident. This reduced the time it took to do the medicines round and reduced time pressures. It also made it easier for us to do our own medicines audits. Staff felt happier."*

The home felt supported though out the project and commented that our inspector kept in contact throughout.

**Care Home 8**
Care Home 8 is a 60-70 bed care home, part of a large UK-wide chain.

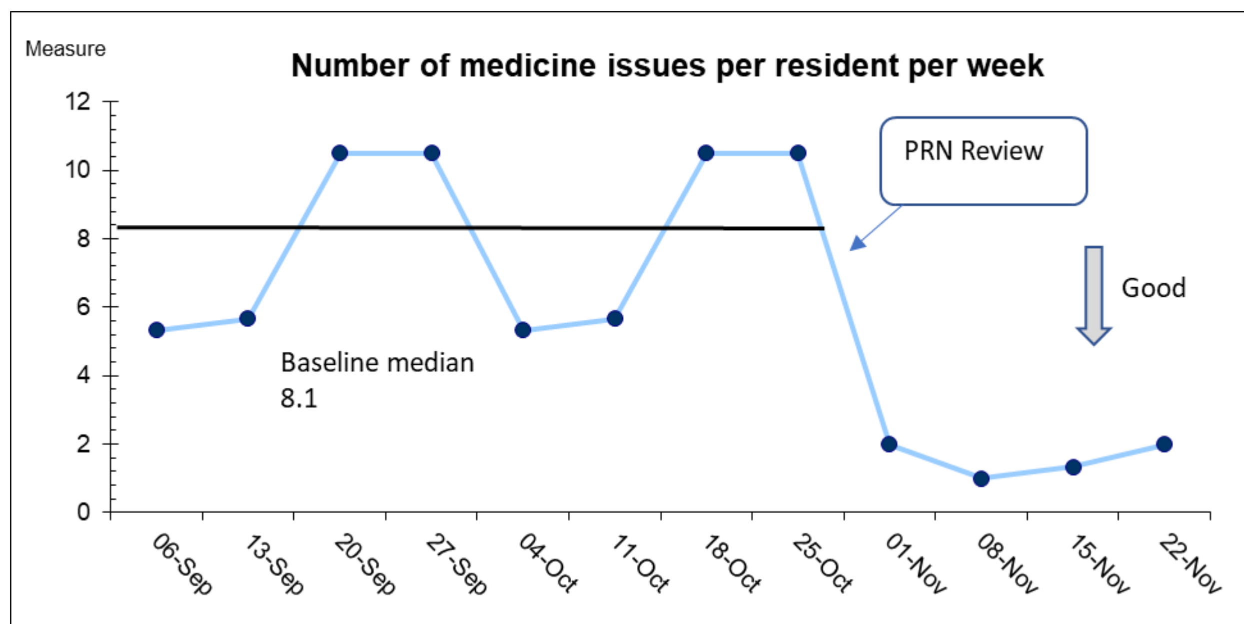



The first test of change for the home in mid-October was an information sheet on the front of the MAR to inform staff on the correct recording procedure, for example when using annotations. This was combined with a daily huddle where work was cross checked by staff from another unit. Overall, this resulted in a 33% reduction in issues, from a baseline mean of 0.9 to a value of 0.6 in the second phase.

The manager commented that she enjoyed learning about the use of quality improvement tools and felt supported throughout the project by the Care Inspectorate.

**Care Home 9**

Care Home 9 is a 30-40 bed facility that is part of part of a UK-wide chain. Over the course of the project, medicines issues were reduced from a baseline median of 8.1 issues per resident per week to a median of 1.67 for the last four weeks. This is a reduction of 79%.




In this home, the project's initial focus was on improved recording in the use and effectiveness of PRN medicines; a similar approach to care home 2. Based on the evidence gathered and subsequent review by the prescriber, this had an impact on residents in two ways; medicines that were no longer effective were stopped (reducing the opportunity for inappropriate side effects), while other medicines were changed to a regular prescription.

The manager of the home gave a positive evaluation of the project launch.

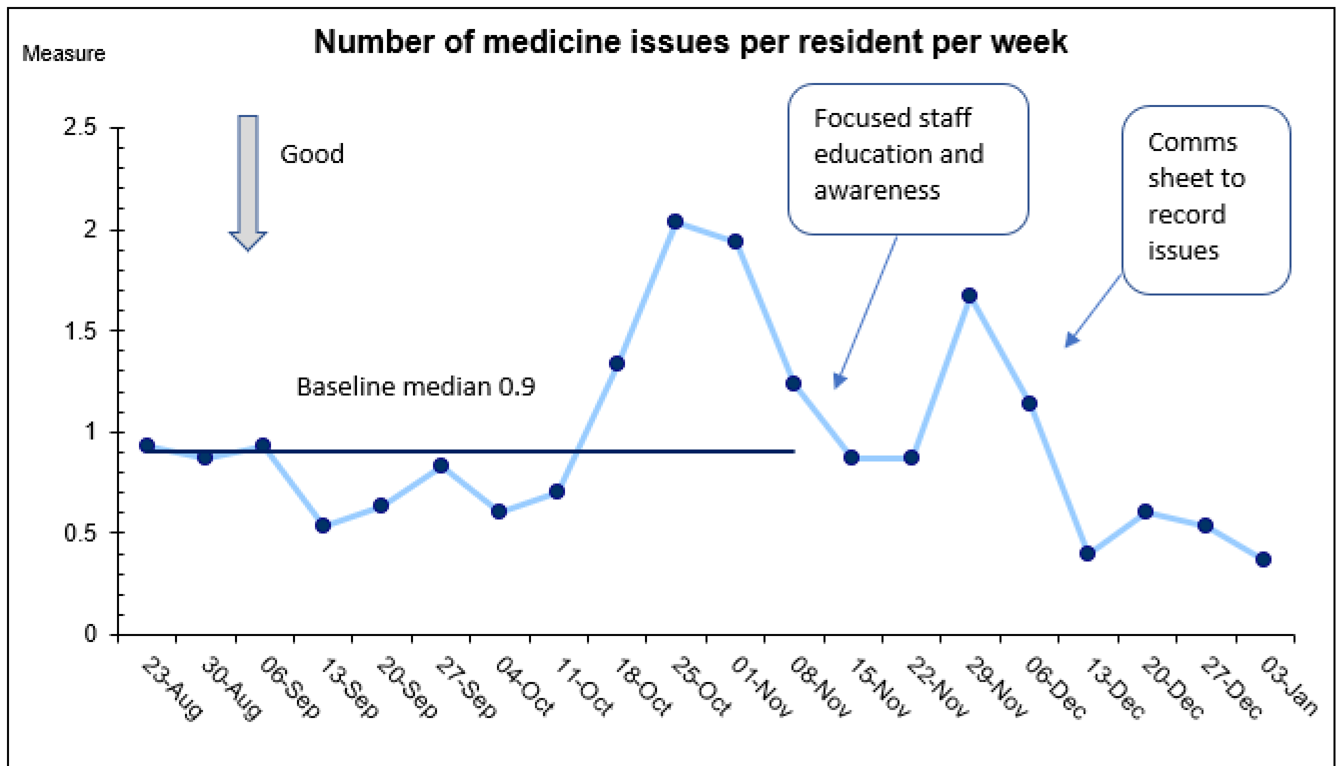
*"Really liked the project launch day as it gave a chance to meet with other homes and share expectations and*

The manager also said there was good support from the Care Inspectorate throughout their involvement in the project, and also from their Scottish Care lead.

At the beginning of January 2020, the manager asked to temporarily stop participation in the project due to competing work priorities.

**Care Home 10**

Care Home 10 is a large (60-70 bed) care home, part of a UK-wide chain. For logistical reasons, this was the only home that our improvement adviser was unable to visit before the project launch.




The service began the project looking at focused staff training, followed by the introduction of a sheet to communicate medicine issues to be resolved. These interventions reduced the medicine issues per resident per week from a baseline median of 0.9 to a value of 0.73 over the eight-week testing period. This is a reduction of 18%.

The manager was absent from the home at the start of 2020. At the end of the project, the manager commented that she felt well supported throughout and lamented that the project was necessarily interrupted by Covid-19. She also felt staff understood the ethos of the project.

*"Staff took on board the systems-based spirit of the project, they got that this was not a personal thing, it was about improving the medicines system as a whole."*

## Use of quality improvement tools

Nine out of the ten homes attended the project launch – Care Home 3 sent apologies due to illness. Seven homes signed up for Learning Session 2 in early February, although technological issues and last-minute work pressures reduced attendance to three.

Just after the project launch, homes were supplied with templates for various quality improvement tools; specifically a project charter, a driver diagram and a PDSA cycle. The homes were also supplied with an example project charter and driver diagram from care homes that took part in a similar medicines improvement project in 2017.

- Thirty percent of homes submitted a personalised completed project charter. (These were Care Homes 2, 7 and 9; Care home 1 did submit a project charter but this was a signed copy of the given template example.)

- Ten percent of homes submitted a driver diagram. (This was Care Home 1.)

- Ten percent of homes submitted Plan Do Study Act (PDSA) cycles. (Care home 10 submitted two of their own PDSA cycle forms at the start of the project; Care Home 8 indicated verbally that they had used PDSA cycle thinking but did not submit any form.)

All ten homes (100%) submitted data over time (see above). At the point that they stopped involvement in the project, eight of the 10 homes (80%) met the targeted reduction of medicines issues. The median reduction in medicine issues was 82%.

Only one home noted they used quality improvement learning on separate project. Care Home 2 used data-over-time charts to monitor the effect of a change in the lunchtime schedule on residents' weights (as measured weekly).

## Discussion

Most homes managed to achieve the ambitious target of a 50% reduction in medicine issues and common themes emerged from this.

Four homes introduced a paper-based system for daily communication of arising issues. This allowed quicker resolution of any issues as well as a frequent reinforcing of good practice.

One home introduced an electronic medicines administration record (eMAR). Impressively, this still managed to reduce medication issues although the existing level in the home was already lowered through previous improvement activity in the project.

The advantages designed into eMAR systems include:

- a variety of safeguards to reduce medicine administration issues, including prompts to ensure doses of medication are not given too early, too late or continued beyond an agreed end date
- rapid feedback on any issues such as missed doses (similar in function to the paper-based interventions mentioned above, though potentially more reliable and less time consuming)
- prompts to record the effectiveness of the medicine administered, if this is required
- accurate stock balances to support the process of ordering medicine.

Published evidence does suggest some success for eMAR in reducing errors, although the systems do require support during the implementation phase[5-8]. However, evidence of eMAR use reducing errors in Scottish care homes is limited, with only 5% of Scottish care homes currently using an eMAR system as of 31 December 2019 (data from the Care Inspectorate annual return). We expect this figure will rise as eMAR is seen as an example of automation as a successful system intervention, as the evidence here would support.


5. Medication barcoding system tested in Welsh care homes improves patient safety. The Pharmaceutical Journal,1 December 2015. https://www.pharmaceutical-journal.com/news-and-analysis/medication-barcoding-system-tested-in-welsh-care-homes-improves-patient-safety/20200192.article
6. Implementation of an electronic medication administration record (eMAR) in a long-term care facility. Age and Ageing, Volume 47, Issue suppl_5, September 2018, Pages v13–v60. https://doi.org/10.1093/ageing/afy140.144
7. New barcode system can slash medicine errors in care homes. Nursing Times, February 3 - 9, 2016, Vol.112(5), p.6. https://www.nursingtimes.net
8. Impact of BCMA on medication errors and patient safety: a summary. Stud Health Technol Inform 2009; 146:439-44. https://www.ncbi.nlm.nih.gov/pubmed/19592882


Another common theme in reduced medicine issues was care staff reviewing the effectiveness and continued need for a medicine, including PRN medicines. In some cases, the evidence gathered by the home led to a review by the prescriber and a change in the medicine regime, with resultant improvement in health and wellbeing. While the polypharmacy guidelines for prescribers[9] should in theory ensure that only effective medicines are prescribed at any time, reviews by the prescriber may not take place at the frequency needed. As such, for care home residents, the review process should be facilitated by care home staff systematically monitoring on an ongoing basis, the effectiveness of a medicine and the condition for which it has been prescribed. A previous example has shown the benefits of this approach[10].

Similarly, a review of the medicine chart by a couple of homes led to the removal of discontinued items from the medicines chart (in liaison with the community pharmacy) making the chart easier and less time consuming for staff to use. This is

similar to findings from a previous improvement project from 2017 in a small (20-30 beds) care home[11].

9. Polypharmacy Guidance. https://www.therapeutics.scot.nhs.uk/wp-content/uploads/2018/04/Polypharmacy-Guidance-2018.pdf
10. NHSGGC-Reviewing Laxatives. https://www.youtube.com/watch?v=U4SumVnAdmA
11. Reducing Medicine Incidents in a Care Home for Older People. https://learn.nes.nhs.scot/13011/quality-improvement-zone/learning-programmes/scottish-improvement-leader-programme-scil/

Two homes tested colour coding on the MAR chart to clarify administration times. In one home, this appeared to have some effect but in another it did not. It may be that the specific context in the first home with the use of agency staff can explain this difference.

Focused staff training on good practice was a factor in three of the homes. It is unlikely staff in the homes did not know what was required from them in terms of good practice however, raising awareness on a regular basis can reinforce expected standards. Staff education can be seen as a less effective form of sustainable intervention[12] however, it should not be dismissed.

12. Patient Safe https://patientsafe.wordpress.com/the-hierarchy-of-intervention-effectiveness/

A couple of homes identified specific issues related to the use of agency staff and they targeted interventions accordingly. Agency staff who are less familiar with standard processes can take more time for medication administration rounds[13], which can result in workload and time pressures.

13. Thomson M et al. Nursing Time Devoted to Medication Administration in Long-Term Care: Clinical, Safety, and Resource Implications. Journal of American Geriatrics Society. 28 January 2009. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1532-5415.2008.02101.

On the surface, the lack of use of quality improvement tools in the project by the homes appears disappointing, particularly given the focus of the Care Inspectorate in promoting quality improvement in the sector over the last three years. However, it may be understandable if viewing the medicine system in the adult care sector through the lens of a stretched, occasionally chaotic system, where complex pressures and competing priorities may make it difficult to fully embrace quality improvement methodology. All the homes in the project had similar Care Inspectorate grades and were large (over 60 beds). Nine were part of UK-wide care home chains; one was an independent care home. Yet the results achieved here were in line with that from a previous project involving a small care home (20-30 beds) of similar grade that was part of a regional chain in Scotland[11].

However, it should be noted that all the homes here did embrace the positive learning and improvement ethos of the project, which historically can be a formidable challenge when dealing with medication issues in both health and social care.  This is encouraging.  Further, one quality improvement tool was adopted by all homes – the use of measurement over time as a method of driving forward behavioural and system change.  One home in the project also used data over time for a separate project in the home.  Six of the homes submitted completed data up to January or beyond.  Of the four others, managerial changes and additional work pressures from January onwards are known about in three.

Another positive aspect of the project was relationship building.  Most of the homes commented on the helpful and regular input from our inspectors in relation to the project and said that this had improved relationships with the Care Inspectorate. (Similar comments were also made about regular inspector contact during the initial Covid-19 phase).  A couple of homes noted the improved internal relationships, with staff pulling together throughout the project.

## Conclusion

The interventions used by homes in this project included a mixture of systems-based and people-focused interventions, from computerisation to checklists, and reviews to staff training.  No single strategy will completely eliminate errors and improve the use of medicines in care homes.  A blended approach of interventions that have some basis for success, appropriate to each home, will likely be more successful.  The successful interventions used in this project may be a useful starting point for other homes looking to improve the management of medicines and improve resident health and wellbeing.

Traditional sector-led approaches to quality assurance have involved RAG (Red Amber Green) style compliance audits.  Such audits tend to be completed by managers monthly or quarterly and can be time consuming.  They do not easily facilitate improvement with medication issues.  A charted measurement of defined medication issues over time can offer assurance on performance <u>as well as being</u> a mechanism for driving forward continuous improvement.  When done by frontline staff it can engender ownership of practice and spread the burden of audit.

A traditional scrutiny-based approach to assurance, with intense yearly or twice-yearly inspections, can lead to improvement through inspector-focused diagnosis of issues, coaching, signposting and sharing of good practice, and service-led focused responses using existing governance structures and strong managerial leadership. Indeed, for two of the homes here, this happened to a large extent just prior to the project.  However, the relationship can sometimes feel adversarial and stressful for both inspectors and services.

The approaches and ethos used in this project may offer a mechanism for improved scrutiny and assurance in a post-Covid landscape where some aspects of the relationship with the Care Inspectorate become smaller, more frequent and virtual.

## Acknowledgements

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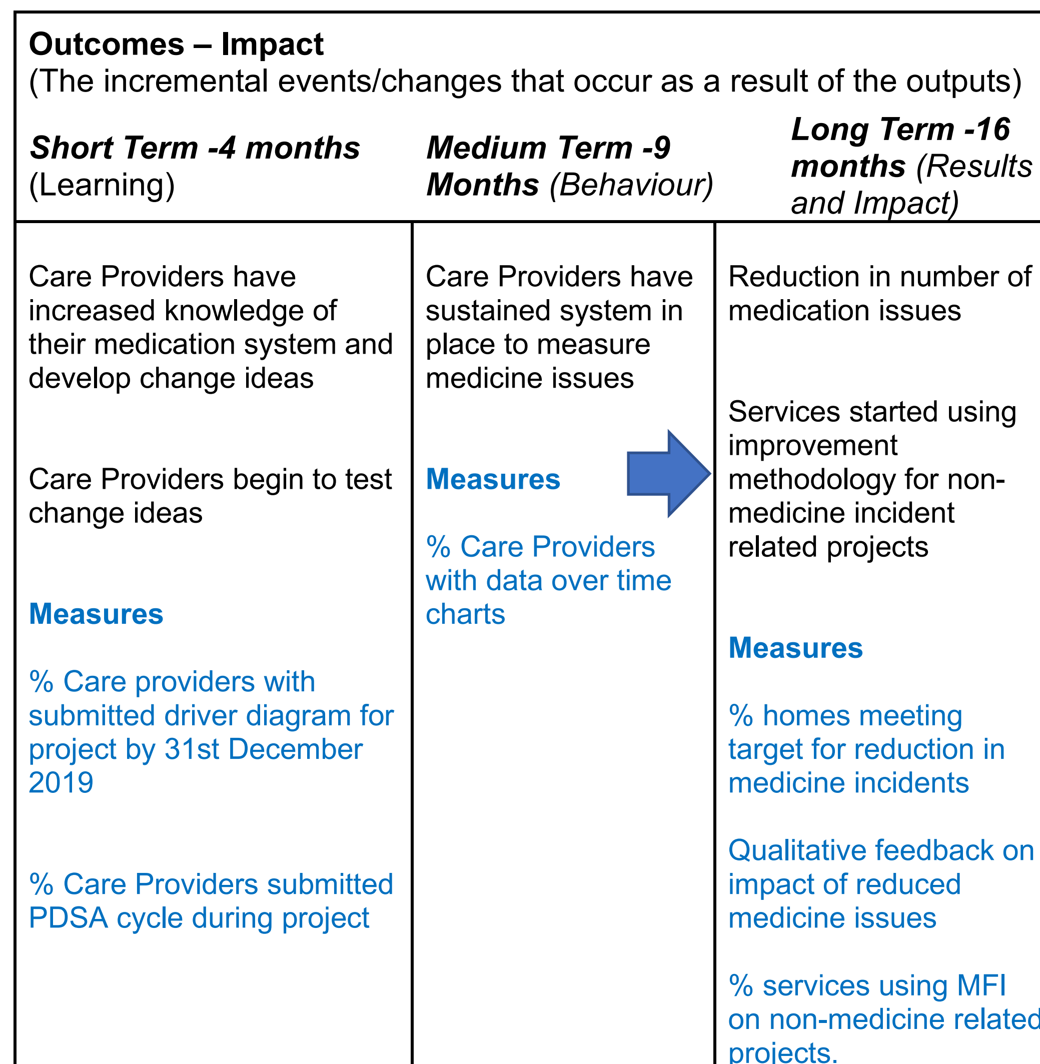
This report was prepared by Dr David Marshall Health Improvement Adviser, Care Inspectorate.

## Appendix 1: Examples of medicine issues from Care Inspectorate controlled drug notifications

| | |
|---|---|
| **Category I** | Events that may have contributed to or resulted in permanent harm (for example, unexpected death, intervention required to sustain life) or known theft of controlled drugs requiring police intervention.<br><br>• *The dose that should have been administered of Midazolam should have been 1mg of a 10mg/2ml vial (i.e. 0.2ml). The nurses misread the MAR sheet and administered 1ml instead of 1 mg. This amount was equal to 5mg, an overdose of 4mg. Resident died soon after.* |
| **Category II** | Events that may have contributed to or resulted in temporary harm, or where intervention or monitoring required was required, or a suspected drug discrepancy.<br><br>• *Omitted dose of Oxycodone MR [analgesic] at 22:00. Resident was in pain and distressed overnight.* |
| **Category III** | Events that had the potential to cause harm, but no harm occurred (for example, near miss or low-impact events).<br><br>• *Senior on duty applied a controlled drug patch on the wrong day.* |

## Appendix 2: Logic Model Outputs and Outcomes

| **Outputs** | |
|---|---|
| *Activities* | *Participation* |
| Training & materials on Improvement Methodology (MFI) and reduction of medicine issues.<br><br>Targeted support on understanding providers system and development of change interventions appropriate to each provider<br><br>Agreement of system to measure effect of change interventions | Care Providers attending each Learning Session<br><br>Care providers with agreed improvement team by October 31st 2020<br><br>**Measures**<br><br>% Care providers attending each Learning Session<br><br>Qualitative & Quantitative feedback on above re increased knowledge of MFI and running improvement project<br><br>% Care providers with submitted project charter by October 31st 2019 |



| **Outcomes – Impact**<br>(The incremental events/changes that occur as a result of the outputs) | | |
|---|---|---|
| ***Short Term -4 months*** (Learning) | ***Medium Term -9 Months*** *(Behaviour)* | ***Long Term -16 months*** *(Results and Impact)* |
| Care Providers have increased knowledge of their medication system and develop change ideas<br><br>Care Providers begin to test change ideas<br><br>**Measures**<br><br>% Care providers with submitted driver diagram for project by 31st December 2019<br><br>% Care Providers submitted PDSA cycle during project | Care Providers have sustained system in place to measure medicine issues<br><br>**Measures**<br><br>% Care Providers with data over time charts | Reduction in number of medication issues<br><br>Services started using improvement methodology for non-medicine incident related projects<br><br>**Measures**<br><br>% homes meeting target for reduction in medicine incidents<br><br>Qualitative feedback on impact of reduced medicine issues<br><br>% services using MFI on non-medicine related projects. |

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