ORIGINAL PRACTICE DEVELOPMENT AND RESEARCH

Live well after stroke

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Abstract

Background: Difficulties in meeting guidelines on the intensity of therapy for acute stroke patients is common internationally. Current UK guidelines recommend patients receive a daily minimum of 45 minutes of each required therapy. This article details practice development work in an acute stroke unit in a large teaching hospital in Ireland, where an audit of stroke patients discharged in one month found that only 27% had received what is deemed 'sufficient' physiotherapy, while 30% had physiotherapy on fewer than half of their days of admission.

Aim: Based on the audit, we looked at how we could increase therapy intensity for patients and correspondingly improve the quality of their experience of care and that of their therapists. We broadened our scope beyond physiotherapy to include occupational and speech and language therapies. We aimed to increase patient treatment time from an average baseline of eight to 16 minutes per day to 45 minutes per day.

Methods: We used a combination of Lean Six Sigma and person-centred improvement principles, in conjunction with appreciative inquiry to redesign the current approach to therapy time.

Results: Following our work, patient therapy time increased cumulatively by 125% across all therapies on days when no group classes were held and by 164% on days with classes. The average time patients spent with no therapy interaction outside therapy hours fell from 5.34 hours to 2.3 hours.

Conclusions: The combination of approaches brought under the banner of the 'Live Well After Stroke' initiative ensured the project catalysed a new and more sustainable way of working together. The use of appreciative inquiry in our practice development workshops worked well as a way of respecting people's sense of purpose and their values, and working with these to articulate, and progress towards, a desired shared future state.

Implications for practice:

- Our use of the improvement sciences of Lean Six Sigma and person-centredness combined with appreciative inquiry demonstrates the synergistic elements of these sciences that can be optimised for use in practice development
- Without a change in resources, ways of providing therapy for this population can be redesigned to increase intensity
- Addressing culture as a key component of a practice development project resulted in an improvement in team collaboration and communication

Keywords: Acute stroke therapy, Lean Six Sigma, person-centredness, practice development, appreciative inquiry, therapy intensity

Introduction

In Ireland, the rate of death and disability from stroke has fallen dramatically since the introduction of the National Clinical Programme for Stroke (NCPS) in 2010. The number of stroke units in Ireland has increased from just one to 21, the rate of thrombolysis has increased from 1% to 11% and discharge directly to a nursing home has decreased from 15% to 8% (Irish Heart Foundation (IHF)/Health Service Executive (HSE) National Stroke Audit, 2015). However, there is still a long way to go if we are to provide a high-quality, person-centred stroke service that offers optimal care to anyone who has a stroke, regardless of age, comorbidities or geographical location. The National Stroke Audit showed 50% of patients are never admitted to a stroke unit during their hospital stay and huge staffing shortfalls in stroke therapy teams across Ireland: 61%, 50% and 31% in occupational therapy, physiotherapy, and speech and language therapy respectively. Furthermore, in spite of a European Economic Research Institute (ESRI) report in 2014 outlining that €12m (£10.8m) could be saved by increased early support discharge services for stroke patients, there are still only five established ESD services nationally, serving only a small proportion of the Irish population (Irish Heart Foundation/ESRI/Royal College of Surgeons in Ireland, 2014).

From experience of working in the area of acute stroke for almost 10 years, in Ireland and in the UK's NHS, the first author (KC) observed that teams working in these areas are, without exception, hardworking, dedicated and skilled, but are unfortunately, also without exception, seriously overworked. As practitioners of the improvement sciences of Lean Six Sigma (LSS) and person-centredness, we knew their use could provide immense value in improving services provided by these teams in order to enhance the quality of the healthcare experience for patients, their families, and staff in the acute stroke unit.

Why we used Lean Six Sigma

Lean Six Sigma (LSS) is a combination of two widely used continuous improvement methods: Lean and Six Sigma. Both have traditionally been used in the manufacturing industry, originating at Toyota and Motorola respectively, but are increasingly used in healthcare across the world (Improta et al., 2018; Antony et al., 2019; Bhat et al., 2020). In healthcare Lean is typically used to release time to care, and Six Sigma focuses on reducing unwanted variation in day-to-day work processes (Teeling et al., 2020). Their combined use has been identified as having an impact on health outcomes, processes and quality of care, finance and patient and staff satisfaction (Deblois and Lepanto, 2016).

Lean Six Sigma methodologies have been used successfully in a wide range of healthcare settings across the world. Recent successful examples from Ireland include its use to streamline a pathway for people following hip fracture (Murphy et al., 2019), and to release time to care for nurses in a private hospital (Davies et al., 2019) and in public hospitals (Kieran et al., 2017; Brown et al., 2019; Creed et al., 2019; Teeling et al., 2019).

Why we used a person-centred approach

McCormack and McCance (2017, p 3) describe person-centredness in healthcare in the following way:

> *'An approach to practice established through the formation and fostering of healthful relationships between all care providers, service users and others significant to them in their lives. It is underpinned by values of respect for persons (personhood), individual right to self-determination, mutual respect and understanding. It is enabled by cultures of empowerment that foster continuous approaches to improvement and innovation such as practice development.'*

The appreciation for, and recognition of, all participants involved in the delivery and receipt of healthcare appealed to us, as enabling improvements in patient care, and in the participation of colleagues and patients is both desirable and necessary. Person-centred cultures and workbased learning are identified as key components of practice development (Manley et al., 2009; Yalden and

McCormack, 2010), with the shift of focus on healthcare activity to the 'client' – or service user – being a key goal of practice development (Chin, 2003).

We were fortunate in that we are qualified and experienced in the use of LSS and also work with person-centred practice development groups within the hospital. One of the authors (SPT) is a lecturer in LSS and a person-centred cultures facilitator; together we could see the benefit of combining person-centred approaches to improvement with LSS methodology. We were also involved in ongoing research in their combined use (Teeling et al., 2020), which further encouraged us to take this approach to our project work.

Aims

When we began our practice development work, guidelines on the intensity of patient therapy in physiotherapy, occupational therapy, and speech and language therapy were not being met; perhaps more importantly, neither were the needs of patients. For the purpose of this study, therapy intensity was measured by the number of days on which a person receives therapy after a stroke, in line with the Irish National Stroke Audit definition. We also addressed the duration of therapy sessions as another aspect of intensity. The Royal College of Physicians in the UK states that patients should 'accumulate at least 45 minutes of each appropriate therapy every day at a frequency that enables them to meet their rehabilitation goals' (Intercollegiate Stroke Working Party, 2016, p 52). There is consistent evidence in the literature that increased frequency and intensity of therapy in the acute phase of stroke improves recovery rate and outcomes (Lohse et al., 2014; Veerbeek et al., 2014; Brady et al., 2016; Schneider et al., 2016).

In April 2018, we carried out an audit of 33 people discharged from our services having experienced a stroke. We found only 27% had received what is deemed by the national stroke audit as 'sufficient' physiotherapy and 30% had physiotherapy on fewer than half of their days of admission.

Although we recognised that access to additional staffing resources could possibly enhance therapy intensity, we sought to examine whether and how we could use existing resources more efficiently, without causing extra workload or undue stress for therapists. The ReAct (Recommended amounts of active therapy) study states that 'recommendations for therapy frequency and intensity will remain unmet in many stroke units unless radical revision of therapists' routine working practices is undertaken' (Clarke et al., 2018, p 30).

Consistent with an LSS approach, we formulated an initial problem statement: *'Acute stroke patients are not receiving the levels of therapy recommended by clinical guidelines'*. We wanted to understand how we could use our current resources in therapy processes across the patient's stroke journey, and across the various therapies involved, to collectively identify opportunities for quality and process improvement. Our aim was to increase therapy intensity for patients coming into contact with our services and thereby improve the quality of their experience and that of the healthcare providers.

Methodology
Respect for persons
At the outset, we focused on the culture of the stroke team before making any attempt to collect data or implement any improvements arising from it. The concept of respect for persons underpins both person-centredness and LSS approaches to improvement (Teeling et al., 2020); it is central to person-centredness (McCormack, 2003), and to the Lean concept of 'Kaizen' (good change) originating from the three main features of the Japanese management philosophy, namely harmony and loyalty, consensus in decision-making and employment for life (Suárez-Barraza et al., 2011). Additionally, person-centredness emphasises the development of person-centred cultures through the use of collaborative, inclusive and participatory (CIP) principles (Dewing et al., 2015).

The stroke team is made up of a team of highly skilled, experienced and motivated therapists. The first author, a longstanding member of the team, was aware that our overall approach to this project would be extremely important to its chance of success. The team had, in the past, gone through many quality improvement initiatives, many of which had struggled to engage all team members, and any improvements implemented had often fallen by the wayside when the service became very busy. The team was aware recommended therapy intensity was not being met and we felt strongly that presenting colleagues with all the ways in which they were somehow 'failing' in this respect would not be an effective way to stimulate real and sustained improvement. Our work was structured around a series of practice development workshops, with scheduling agreed by participants (see Table 1, page 6). Although predominantly focusing on the work of therapists, these workshops included participants from the entire acute stroke team, including nursing, medical and administration staff. This enabled us to avoid any potential 'siloed' thinking by the therapy teams.

During conversations in the first practice development, therapists and other members of the interdisciplinary team highlighted that inadequate time for communication was a factor that hindered improvement. We felt this was a starting point from which we might begin to explore opportunities.

With no likelihood of additional resources, we knew we would have to inquire into the acute stroke team's ways of working before we could begin to address therapy levels. We began by using Rolfe and colleagues' (2001) model of reflection to ask 'How are we doing?'
- *What?* Working with the acute stroke team, one issue identified was communication and collaboration
- *So what?* Without better communication and collaboration there could be no improvement for patients or for staff in respect of giving and receiving therapy
- *Now what?* We had had some experience of using appreciative inquiry (Cooperrider and Whitney, 2005) in the NHS and felt that it would provide a fitting overall approach to improvement within this team. We also felt LSS and person-centredness would be key to our approach

Appreciative inquiry
Appreciative inquiry is a collaborative, strengths-based approach to change in organisations. Its fundamental premise is that, rather than the traditional problem- or deficit-based approach, a strengths-based or affirmative approach is taken (Cooperrider and Whitney, 2005). This assumes that groups and teams within organisations all have a 'positive core' of strengths that allows problems to be addressed by starting from a positive standpoint. The '4D' cycle of appreciative inquiry was outlined by Cooperrider and Whitney in 2005. The first stage is 'discovery', where the whole system or team is mobilised into an inquiry into the positive core. This is followed by the 'dream' stage, where a clear, results-oriented vision is created in relation to the discovered potential and also in relation to questions of higher purpose – 'What is the world calling us to become?' (Cooperrider and Whitney, 2005, p 5). After this is the 'design' stage, where a proposition for the ideal organisation is created – one people feel is capable of enhancing and leveraging the positive core to realise the articulated new dream. Finally, comes the 'destiny' stage, where the affirmative capability of the whole system is strengthened, enabling it to build hope and momentum around a deep purpose and creating processes for learning, adjustment and improvisation.

Mindful that participants might have experienced a deficits-based approach to problem solving in the past, our second practice development workshop with the therapy team focused on our 'positive core' for the 'discovery' stage of the appreciative inquiry cycle. It was important that this, and all subsequent workshops, were carried out at a convenient time for all team members so as to maximise participation and capture all team members' perspectives. It was agreed the workshops would be held during what was the usual lunch hour. Workshop 2 took the form of an initial explanation of the appreciative inquiry method and its various stages, followed by brainstorming and discussion of what makes up the 'positive core' of the team, to enable a consensus to be reached. The more traditional

deficits-based approach to improvement may have contributed to some initial scepticism among participants, but the workshops proved an extremely uplifting experience. The use of visuals, such as cards comprising images and words, were used to ascertain how staff felt pre- and post-workshop, with time allowed for them to discuss their thoughts, feelings and emotions. Participants overwhelmingly found this approach to be inclusive and respectful of them and their colleagues. Additionally, personal feedback to the first author was that this way of working was a positive change in itself. In Workshop 3, we outlined our 'dream', 'design' and 'destiny' stages (Table 1). For example, we discussed and brainstormed what our ideal stroke unit and service would look like, and how it would be perceived by our patients, their families, fellow therapists and other colleagues on the team.

We took the outcomes from these workshops and represented them as posters (Figure 1). When subsequently considering specific improvements in Workshops 4 and 5, we displayed the posters, ensuring that our positive core as a team and our shared vision for the stroke unit provided the backdrop to the discussions. We also displayed the posters on the unit's quality board, as a way of reminding the whole team, as well as our patients and their caregivers, of our strengths as a team and our shared vision for the future of our unit.
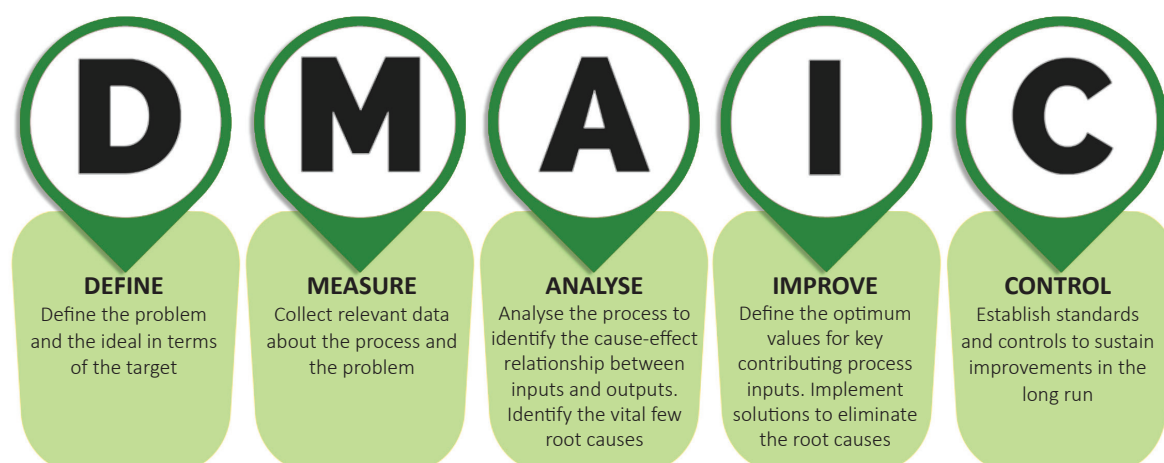
Figure 1: Practice development workshop posters

Six Sigma DMAIC (Define, Measure, Analyse, Improve, Control) framework
The DMAIC framework is the problem-solving framework that underpins Six Sigma (Figure 2). It is used to improve existing process problems that have no clearly identifiable causes.

Figure 2: DMAIC framework

DEFINE	MEASURE	ANALYSE	IMPROVE	CONTROL
Define the problem and the ideal in terms of the target	Collect relevant data about the process and the problem	Analyse the process to identify the cause-effect relationship between inputs and outputs. Identify the vital few root causes	Define the optimum values for key contributing process inputs. Implement solutions to eliminate the root causes	Establish standards and controls to sustain improvements in the long run

The first DMAIC phase is 'define', where an understanding of current perceptions of problems is sought. Workshops 1-3 were held during this phase, using appreciative inquiry to create a positive shared vision of the future of the service, as well as team discussion to gain every team member's perspective on the issues faced. Data collection continued with the second 'measure' phase, in which problems were quantified through further engagement with colleagues, discussion with patients and their families so as to better understand their experiences of care, and collection of relevant data relating to therapy. In the third DMAIC step the data were analysed, and during the fourth 'improve' step, during Workshops 4 and 5, we carried out a root cause analysis with the therapy teams and brainstormed solutions. The fifth step – 'control' – involved collaborative discussion of the findings and a sustainability plan for agreed solutions (Workshop 6). We used our experience of DMAIC and appreciative inquiry phases to align activities informed by both approaches to change (Table 1).

Table 1: Practice development workshops			
Workshop/date	**Focus of workshop**	**Appreciate inquiry phase(s)**	**DMAIC phase**
1/September	Areas for improving preliminary discussions		Define
2/October	Appreciate inquiry workshop: establishing the team's 'positive core'	Discovery	Define
3/November	Appreciate inquiry workshop: 'dream, design and destiny' phases	Dream Design Destiny	Define
4/March	'Live well after stroke' branding exercise		Improve
5/April	PICK chart: solution generation		Improve
6/June	Collaborative discussion of findings and sustainability plan for solutions		Control

Collaboration, inclusion and participation (CIP)

We structured our engagement with the therapy team using a Lean stakeholder engagement tool known as a RACI matrix (Responsible, Accountable, Consulted and Informed) to help us collectively understand the roles and responsibilities of individual stakeholders in relation to the therapy services, and how we might best engage them. To avoid reducing our engagement to a tickbox exercise, we continuously drew on person-centred CIP practice development principles (Manley et al., 2008) to inform our thinking about how we could work with colleagues to evaluate and improve our service.

Our collaborative work with the team made use of the Claims, Concerns and Issues framework (Guba and Lincoln, 1989) to enable team members to have their views both heard and recognised.

Findings
From Workshop 1 we generated 103 individual pieces of written data with suggestions for areas of improvement. Of these, 57 (55%) indicated a desire to focus on therapy intensity and provision, which we felt gave us a clear mandate to proceed. We then clarified the scope of the project to focus on therapy intensity for patients admitted with acute stroke, including physiotherapy, occupational therapy, and speech and language therapy.

Using the data obtained from the first three workshops, we populated a Lean tool known as a Critical to Quality (CTQ) tree (Figure 3). This was used to identify the needs of the customer (patients in our example below, but also highly relevant to staff), what resources (known in Six Sigma as 'drivers') the organisation should have in place to meet these needs and what metrics indicate whether a driver is addressing the need. The CTQ tree is designed to capture the key measurable characteristics of a process or service whose performance standards must be met in order to satisfy the service user (Rath and Strong, 2002). Methods to understand service user and stakeholder experiences are also found in programmes aimed at enhancing person-centred cultures and care (Dewing et al., 2015) and the CTQ complements these.

Figure 3: CTQ tree
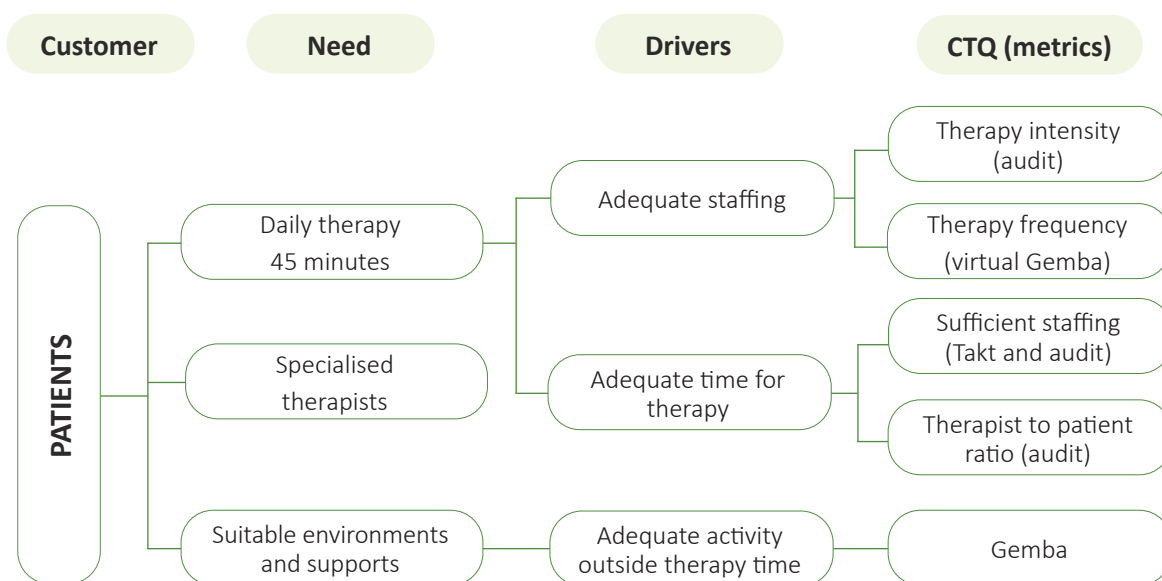
Within the first three practice development workshops (the 'define' phase of DMAIC), we collectively agreed to measure our current therapy intensity. Moving on to the 'measure' phase of the DMAIC process, we carried out an audit of the amount of time therapists were spending with patients over a week in December 2018 and a week in January 2019 (Figure 4). These weeks were chosen as a representation of two typical weeks in the stroke unit. An audit to measure the number of weekly patient sessions was carried out for physiotherapy, occupational therapy, and speech and language therapy. This showed that the average number of weekly patient sessions was four for physiotherapy, 2.2 for occupational therapy and 2.4 for speech and language therapy, against a recommendation of five weekly sessions for each therapy. These audits indicated patients were receiving therapy at less than 50% of the recommended intensity (Intercollegiate Stroke Working Party, 2016). This was seen across all therapies, with some variation in treatment frequency among therapies. Since these audits were snapshots of therapy activity, we decided to follow them up with observational studies of therapist practice areas.

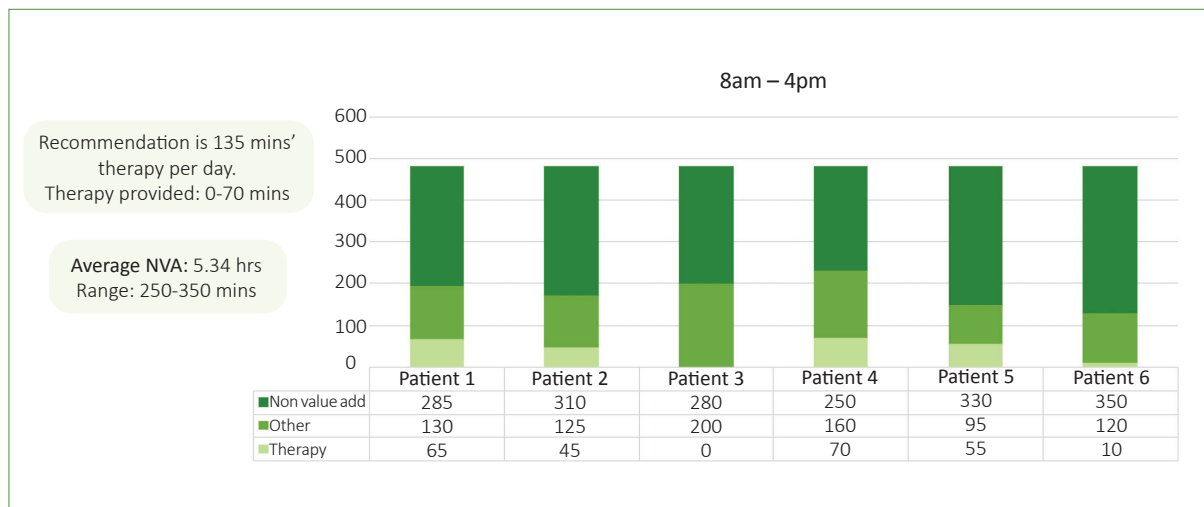**Figure 4: Audit of therapy times: December 2018 and January 2019**
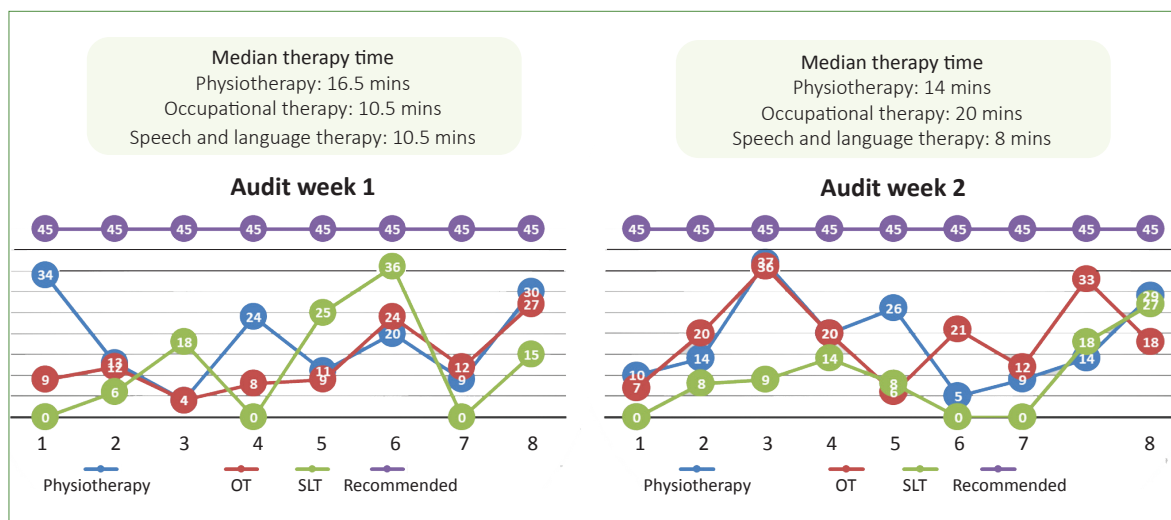
A Gemba walk is a Lean tool that gathers information through real-time observation and 'requires that leaders go to the place where value is created' (Aij and Teunissen, 2017, p 723). The original Japanese terminology derives from *gembutsu*, which literally translates into 'real thing'. Gemba walks are very similar to the workplace observational studies used in practice development (Dewing and McCormack, 2015) to observe the processes people engage in and the context in which they work. This has been identified as one of the synergies between Lean and person-centred approaches to improvement (Teeling et al., 2020).
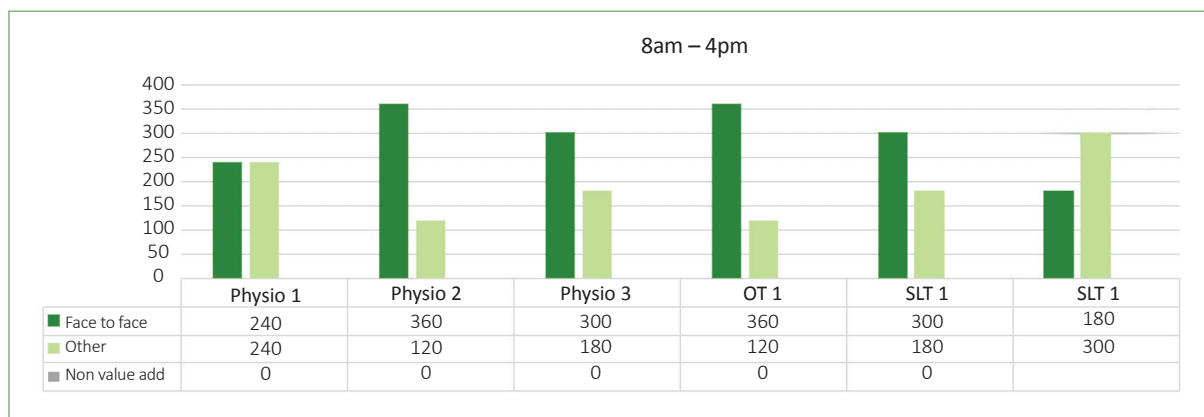
A Gemba was carried out in the acute stroke unit to establish how patients were spending their time outside dedicated therapy time, as there is evidence in the literature that it is beneficial for patient outcomes to carry out exercise outside scheduled therapy sessions (Jones et al., 2000; Williams, 2007). The Gemba was completed with six patients in the acute stroke unit, all of whom were being seen by physiotherapists, occupational therapists, and speech and language therapists. We found that, out of a possible eight hours during which they could receive therapy, these patients were spending an average of 5.34 hours sitting in a chair or in bed, with no interaction, activity or stimulation (Figure 5). We classified this as what is known in Lean as 'non-value-added' time. Therapy time was classified as 'value-added time' and all other activities – receiving medications, reading, talking to staff or visitors, watching television – was classified as 'other'. Importantly, we were aware from our discussions with patients and from the literature that it was important to allow for adequate rest time between therapy sessions (Purcell et al., 2018) but also that patients wanted interaction outside therapy hours. Consistent with a person-centred approach to practice development, we also carried out a staff Gemba, which revealed no non-value-added time for the relevant staff (Figure 6).

Figure 5: Patient Gemba

8am – 4pm

Recommendation is 135 mins'
therapy per day.
Therapy provided: 0-70 mins

Average NVA: 5.34 hrs
Range: 250-350 mins

	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Patient 6
■ Non value add	285	310	280	250	330	350
■ Other	130	125	200	160	95	120
■ Therapy	65	45	0	70	55	10

Figure 6: Staff Gemba

8am – 4pm

	Physio 1	Physio 2	Physio 3	OT 1	SLT 1	SLT 1
■ Face to face	240	360	300	360	300	180
■ Other	240	120	180	120	180	300
■ Non value add	0	0	0	0	0	

Using a Lean formula we calculated what is known in Lean as 'Takt time' for our process. The term originates from the German word *takt*, which means a beat or a pulse, and uses a formula to calculate how much care you can provide in the time available, based on need. We determined that we could use this to look at the time available to therapists on a typical shift, their patient caseload and, given the need, the amount of time they could spend with each patient without adversely affecting other patients' care. Put more simply, we translated the data we had collected from our observations into an ideal patient-therapist ratio. We felt this was an important baseline to establish to enable us to be cognisant of therapist workload and demand on their time, and any room for improvement in patient therapy intensity. This was important in looking at both patient and therapist experiences of care. From our calculations we established that in order for the stroke therapists to provide the optimal level of therapy for our patients, we would need to have six patients scheduled to each therapist per day. The average number of patients on senior physiotherapists 'books' from January to May of 2019 was 12 and ranged from eight to 16 patients.

Our collaborative work found that:
- We were providing less than 50% of recommended levels of therapy
- Our patients were spending an average of 5.34 out of eight possible therapy hours with no therapy or activity offered
- The busy nature of the working environment and complexity of the work did not allow adequate time for collaborative teambuilding within the acute stroke team

In moving into the 'improve' phase of the DMAIC process, we had anticipated that our solutions would be multifaceted in order to address these three issues. For this reason, during Workshop 4 (Table 1), the team decided to create a 'brand' for the initiative that pulled the various solutions together so each would be seen as working towards achieving the shared vision created during the appreciative inquiry process. The name 'Live Well After Stroke' was decided upon and a logo created, featuring a hot air balloon to represent how we 'lift' our patients after a stroke, with the merging colours of the balloon representing the move towards interdisciplinary working.

Using the three issues outlined above as a focus and our appreciative inquiry posters as a backdrop, we held Workshop 5, during which we discussed a range of possible solutions. As another way of promoting the idea that we are all members of the stroke team rather than individual professionals, we agreed that all team members would wear scrubs for these sessions instead of our usual uniforms. The team brainstormed ideas for possible solutions, which were mapped on a visual LSS tool known as a PICK chart, which is used when a team is considering multiple improvement ideas. Ideas are categorised according to ease of implementation and size of potential payoff, and therefore categorised as either 'Possible, Implement, Challenge or Kill'. From this we took proposed solutions from the 'implement' box and got to work. This team-based approach to identifying and discussing problems contributed to a collaborative and inclusive set of solutions, generated and agreed by all members.

Solution 1: Weekly goal-setting and timetabling meeting
We had discussed the issue of lack of collaboration and communication at the initial stages of the project and as a result of our work in Workshop 5, we decided to begin weekly goal-setting and timetabling meetings involving representatives from physiotherapy, occupational therapy, and speech and language therapy. As well as the facilitation of improved communication among the therapy team, this also reflects the recommendation of the Royal College of Physicians that patient-centred goal setting should take place (RCP, 2016) as well as the recommendation from the REACT study that the use of individualised patient timetables would have a positive impact on frequency and intensity of therapy in acute stroke units (Clarke et al., 2018).

Solution 2: Individualised therapy workbook and therapy logs
As well as a copy of their weekly interdisciplinary therapy timetable and goals, patients under the care of the acute stroke team were allocated individualised therapy workbooks with activities to be done outside face-to-face therapy time, and a log to keep track of them in order to provide motivation for patients and allow therapists to monitor activity levels. These workbooks were also a way to help families and carers stay aware of progress and carry out exercises or activities with patients when appropriate. Patients and families advised their therapists that they found the workbook very useful as an enhancement to normal therapy.

Solution 3: Group exercise classes relaunched
As part of this project, group classes that previously had been on hiatus due to staffing levels, were prioritised and relaunched on the ward on two days per week, for an hour each day.

*Solution 4: Weekly quality update*
A 10-minute quality update was added to the weekly multidisciplinary acute stroke team meeting. This allowed the team to give feedback on progress on the Live Well After Stroke initiative and allocate any tasks that needed to be completed. Any feedback from patients, families and carers was also shared at this update, as were any success stories.

*Solution 5: Relaunch of rotation induction for new medical staff*
Commensurate with the relaunch of group exercise classes (solution 3) we prioritised the relaunch of a rotation induction programme for medical staff new to the acute stroke unit, to include information on the Live Well After Stroke initiative. This was particularly useful to ensure all staff on the unit were aware of the solutions being implemented, as well as the work that had been done at the practice development workshops throughout the process.

The audit of therapy intensity was repeated in August, on a day when group classes were held and on a day without classes. Average patients per therapist on the repeat audit week were: 12 for occupational therapy (9.5 on previous audit); 9.5 for physiotherapy (10.5); and 13 for speech and language therapy (12). Median therapy times on the repeat audit for the non-class day were: 40 minutes for physiotherapy (previously 14-16.5); 30 minutes for occupational therapy (10.5-20); and 20 minutes for speech and language therapy (8-10.5) (Figure 7). On the day when group classes took place, median times were: physiotherapy, 48 minutes; occupational therapy, 35 minutes; speech and language therapy, 23 minutes (Figure 8). This represents an increase in patient therapy time cumulatively across all therapies of 125% on days without group classes were held and 164% on days with group classes.

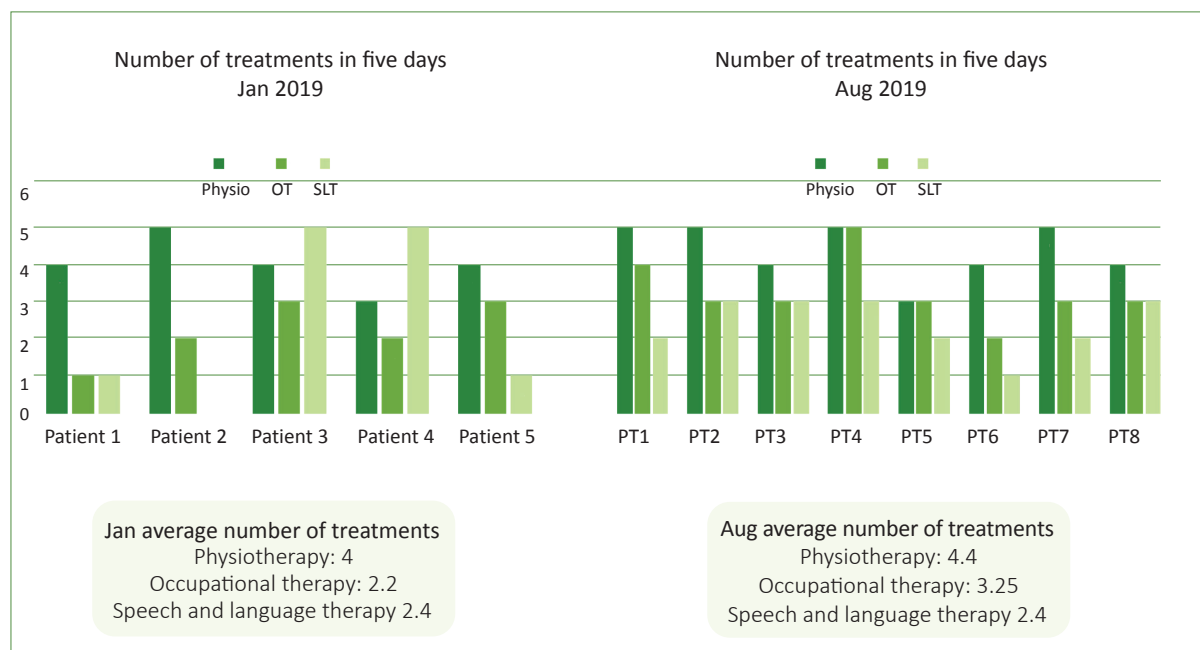**Figure 7: Non-class day repeat audit**
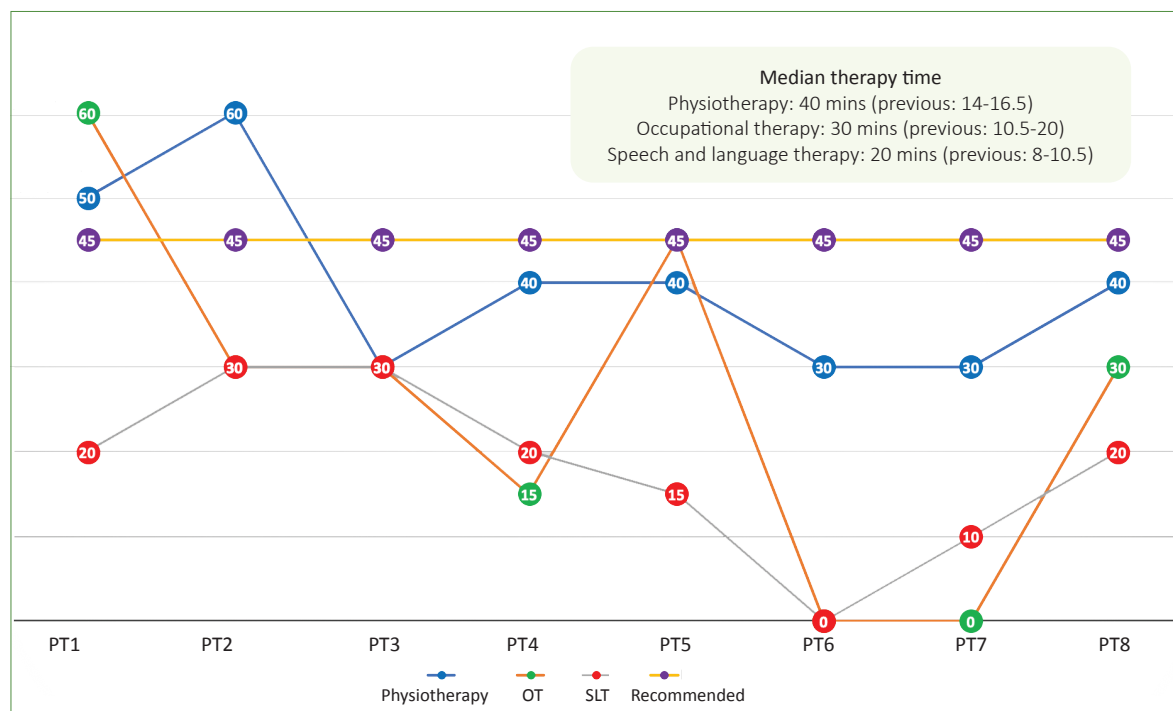
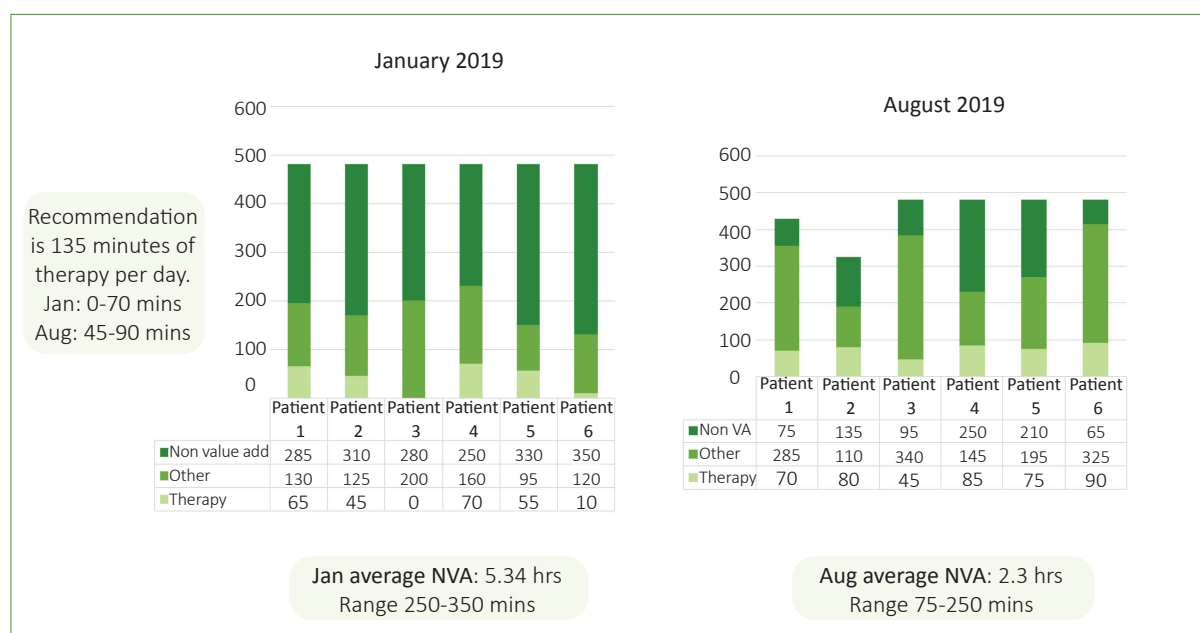
Figure 8: Class day repeat audit
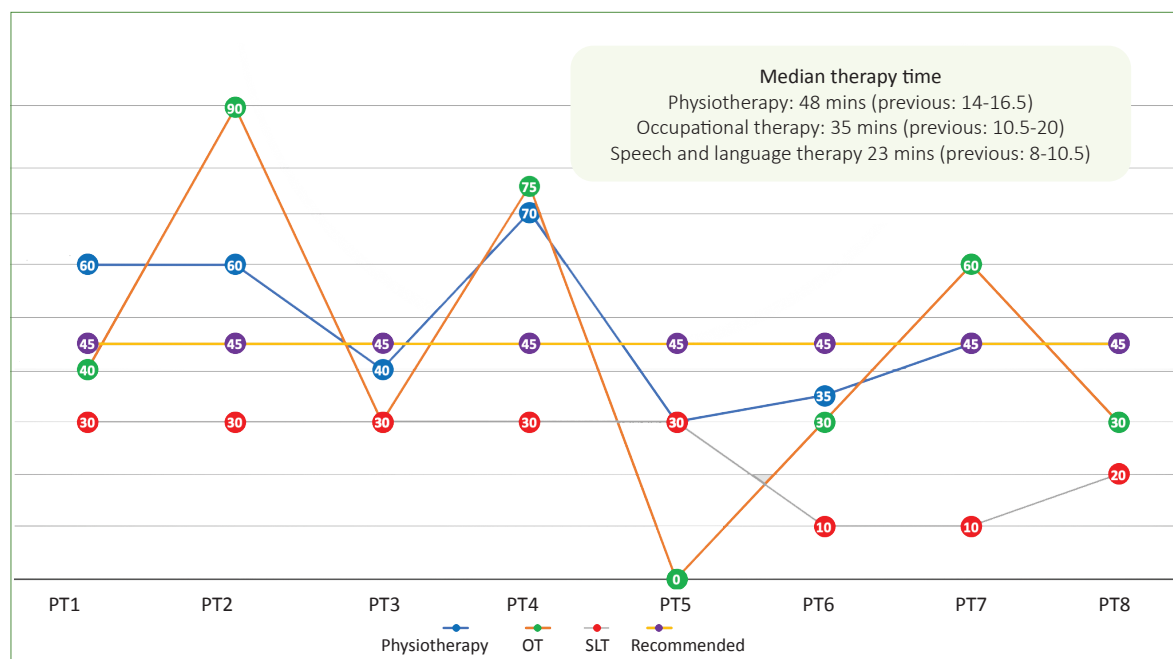
The Gemba was also repeated and showed average treatments per week of 4.4 for physiotherapy (previously 4), 3.25 for occupational therapy (2.2) and 2.4 for speech and language therapy (2.4) (Figure 9). The repeated patient Gemba showed a reduction in the amount of 'non-value-added' time to an average of 2.3 hours (range 1.25-4.16) from 5.34 hours (range 4.16-5.8) from when it was first measured (Figure 10). As the patient groups were different between the initial to the final measurements, direct comparison between time points was not possible but feedback from patients and families involved in the new process highlighted their satisfaction with the group classes and workbooks in particular. Feedback from the stroke team during and after workshops indicated the collaborative approach to devising the changes, as well as the nature of the changes – team timetabling and goal setting, interdisciplinary patient workbooks and increased opportunities for communication – represented a new way of working that led to improvements for those delivering and receiving stroke care.

Figure 9: Repeat Gemba

Number of treatments in five days
Jan 2019

Physio   OT   SLT

Jan average number of treatments
Physiotherapy: 4
Occupational therapy: 2.2
Speech and language therapy 2.4

Number of treatments in five days
Aug 2019

Physio   OT   SLT

Aug average number of treatments
Physiotherapy: 4.4
Occupational therapy: 3.25
Speech and language therapy 2.4

Figure 10: Repeat patient Gemba

January 2019

Recommendation is 135 minutes of therapy per day.
Jan: 0-70 mins
Aug: 45-90 mins

	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Patient 6
Non value add	285	310	280	250	330	350
Other	130	125	200	160	95	120
Therapy	65	45	0	70	55	10

Jan average NVA: 5.34 hrs
Range 250-350 mins

August 2019

	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Patient 6
Non VA	75	135	95	250	210	65
Other	285	110	340	145	195	325
Therapy	70	80	45	85	75	90

Aug average NVA: 2.3 hrs
Range 75-250 mins

Discussion and conclusions

The creation of the Live Well After Stroke initiative brought together our multifaceted solutions and, more importantly, ensured the project was not just a finite piece of improvement work but catalysed a new and more sustainable way of working together. The solutions implemented in the 'improve' phase of the DMAIC framework were those shown by the PICK chart to be suitable for implementation straight away, but the use of PICK combined with the 'design' stage of appreciative inquiry created a repository of excellent solutions for the longer term to continue progress towards our shared vision of a gold standard stroke unit offering the best possible experience and outcomes for our patients and our staff. Examples of solutions are, in the short term, shared paperwork to minimise duplication and so allow more face-to-face patient time, and in the longer term, the launch of an app for our unit which would encompass tailored education, exercises and timetables. One member of the stroke therapy team has agreed to be the process owner for the 'Live Well After Stroke' initiative as it moves into the 'control' phase of the DMAIC process. This provides a strong foundation for the team to address future challenges as well as continuing work to improve our response to the issues addressed by this project. This will enhance the longevity of the 'Live Well After Stroke' initiative.

We found the use of appreciative inquiry in our practice development workshops worked well as a way of respecting people's sense of purpose and their values, and working with these to articulate, and progress towards, a desired shared future state. In this sense, appreciative inquiry resonates with the Three Horizons framework for envisioning and planning for the future (Leicester, 2016). This framework has been used to prompt discussion of transformative innovation in various organisations including healthcare, and as a basis for strategic thinking. The first horizon, H1, is the dominant system at present or 'business as usual'. Outlining the first horizon as a team allows a view of which aspects of business as usual are no longer fit for purpose. H2 refers to the spaces in an organisation where innovation is already taking place, often 'under the radar'. When these innovations start to become more effective than the original way of doing things, a pivot point of disruption is reached, which can be difficult to negotiate. Finally, H3 is the long-term successor to business as usual, the transformative innovation that completely changes the way an organisation does things. This method of envisaging the future can instil hope and change outlooks and behaviours in a similar way to the dream and design stages of appreciative inquiry.

These resonate also with Laloux's (2016) work on reinventing organisations. Laloux describes the potential benefits of 'next-stage organisations' – those recognised as living systems with their own creative potential and evolutionary purpose. In these organisations, directive, template- and protocol-based ways of working are superseded by collaboration and self-management, and bringing the whole person to work, as are the hierarchical, role- and rule-bound structures still widely seen, including in healthcare organisations.

The ability to locate and contextualise the approaches to improvement and inquiry that underpinned the 'Live Well After Stroke' initiative within systems thinking frameworks such as those of Leicester and Laloux is a key learning outcome of the university programme in LSS, in which the first author is a graduate and which the other two authors teach (McNamara and Teeling, 2019).

Implications for practice

A deep appreciation of the system (Deming, 2018), in which inquiries are conducted and improvements implemented, was critical to the effective use of the person-centred and LSS improvement approaches in this initiative. These approaches, alongside appreciative inquiry, helped to build team relationships, enabled collaborative working towards a shared vision and future, and provided a coherent and structured framework to identify and address the problems faced by the team. LSS tools provided an invaluable way to clarify and detail the problem at hand, and to pinpoint where solutions should be focused. Throughout the process they served to keep focus on what would add the greatest value to patients, the team and the service. The initiative showed how person-centred practice development

and appreciative inquiry complement LSS, making it more meaningful for staff and more explicitly consistent with their personal and professional purpose, and values. The combined approach enabled us to secure excellent engagement from colleagues, which can remain elusive even in the most carefully planned and executed projects. The improvements achieved by the work discussed in this article highlight the dynamic interplay between evidence of best practice in stroke care, sensitivity to the particular context in which improvements are being made and choice of facilitation style, in this case the CIP approach characteristic of person-centred cultures of care. This aligns well to the Promoting Action on Research Implementation in Health Services (PARIHS) framework, which proposes that successful improvement projects are a function of the interplay of evidence, context and facilitation (Rycroft-Malone, 2004).

Reflecting on the initiative, the participants felt some ethically approved 'talking heads' videos with staff, patients and their relatives would have been an worthwhile addition to the project; running them on a loop on the ward monitor and on the hospital website could have captured the 'voice' of all those involved in a relatively inexpensive way. The vision for this practice development work is that the 'Live Well After Stroke' initiative becomes integral to the team's ways of working and being, and its principles could be applied to other conditions in other populations in our own and other hospitals.

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