International Practice Development Journal

Online journal of FoNS in association with the IPDC and PcP-ICoP (ISSN 2046-9292)

ORIGINAL ARTICLE

The application of a person-centred approach to process improvement in ophthalmology services in the North East of the Republic of Ireland

Seán Paul Teeling*, Anne-Marie Keown, Úna Cunningham and David Keegan

*Corresponding author: University College Dublin and Mater Misericordiae University Hospital, Dublin, Ireland
Email: sean.p.teeling@ucd.ie

Submitted for publication: 3rd March 2023
Accepted for publication: 17th April 2023
Published: 24th May 2023
https://doi.org/10.19043/ipdj.131.006

Abstract

Background: Ophthalmology in the Republic of Ireland has one of the longest waiting lists in healthcare, with around 44,000 people awaiting a first outpatient appointment. In the north-east region, 12,500 people are waiting. The North-Eastern Region Integrated Eye Care Service (NERIECS) was established in 2021 to improve patient care and access to services. A key driver for the team was to understand 'how we work together' to enable a shared vision of change within regional services.

Aim: To support hospital and community ophthalmology services, which comprise eight organisations in the region, to prepare for the development of system-level integration of eyecare services.

Methods: We integrated a popular process-improvement methodology, Lean Six Sigma, with a person-centred approach to support staff to develop a shared vision of change and to deliver improvements for ophthalmology services.

Findings: The integrated approach enabled staff to work in ways that supported the development of good quality, person-centred care that takes account of the outcomes for and experiences of ophthalmology patients and their families, and of staff.

Conclusions: Our work builds on a recent study that identified coherence in the underlying philosophy, intention, method and outcomes of Lean Six Sigma and person-centred approaches to healthcare improvement, highlighting the added value of an integrated approach in enabling improvement that positively impacts patient outcomes and healthcare culture.

Implications for practice:

- The application of an integrated approach to process improvement in healthcare is shown to be effective beyond a single study site, having a positive impact across geographic and organisational boundaries, and across levels of care (primary, secondary, tertiary and post-acute)
- The integrated approach puts the focus on synergies between both methodological approaches and avoids improvement work being reduced to the use of a decontextualised toolkit

Keywords: Improvement, Lean Six Sigma, person-centred, customer voice, ophthalmology, healthcare system

Introduction

Delivery of eyecare services in the Republic of Ireland has been challenging for many years and now has the longest waiting list in the country, with around 44,000 patients awaiting ophthalmology outpatient appointments and more than 20,000 awaiting a community appointment (National Treatment Purchase Fund, 2022). Ophthalmology services in the North East Region are currently delivered in a hospital-centric manner; community ophthalmology is fragmented, underfunded and lacks coordinated integration within and across different services. As currently configured, the service is unable to meet the high demand for ophthalmic care within the hospital and community healthcare organisations across the region. Currently, 12,500 people in the region are waiting for treatment: 8,500 for treatment in the acute hospital and a further 4,000 in the community.

The national programme for eyecare (Irish College of Ophthalmologists, 2017) and the primary review of eyecare by the Irish Health Service Executive (HSE, 2017) recommended a greater focus on community-based services, with teams working in well-resourced clinics to facilitate the movement of patients on hospital waiting lists into the community setting for ongoing management. The vision is for a regionalised community-based care model, with clear pathways of referral into acute care services and back to the community where clinically appropriate. However, by 2020, when our work commenced, no significant progress towards the delivery of a cohesive ophthalmic service to patients existed, a contributing factor to the growing waits for treatment.

To compound this, in common with all healthcare services, the waiting list for access to ophthalmology services was impacted by the Covid-19 pandemic, with an unprecedented disruption of routine medical care and corresponding impact on scheduled non-emergency procedures (Pantelli, 2020). In the Republic of Ireland, in an effort to minimise transmission and to free up capacity in the hospital sector during the first pandemic wave between March and June 2020, only healthcare commitments deemed essential proceeded. This disruption in service along with the logistics of returning to routine scheduled services has been a challenge for health services internationally (Webb et al., 2020).

Sláintecare, Ireland's 10-year programme to transform health and social care services, advocates the development of a more integrated health service, centred on a comprehensive community-based model, and provides a framework within which Irish health services will develop over the coming decade (Government of Ireland, 2022). Drawing on the report from the college, the HSE review and Sláintecare, a group of people working in ophthalmology services in the north east of Ireland came together in 2020 to form a working group to develop a cohesive plan of action to address the service problems in the region. The need for such a plan was underlined by the knowledge that over the next 30 years, the number of people needing ophthalmology services will more than double, reflecting Ireland's ageing population (Irish College of Ophthalmologists, 2017). The most common causes of loss of sight in Ireland are cataract, glaucoma and age-related macular degeneration and the biggest risk factor for these is increasing age. In up to 60% of these cases, sight can be restored but this requires timely access to responsive eyecare services. The working group, therefore, saw a need for urgent action.

Background

The North East Region Integrated Eye Care Service (NERIECS)

The working group was the starting point for the North East Region Integrated Eye Care Service (NERIECS), a unique collaboration of multidisciplinary staff from acute eyecare services, (three hospital groups), community healthcare (three organisations) and voluntary providers of eyecare, across the 1.2 million population of the region (Figure 1), alongside researchers from two academic partners, University College Dublin (UCD) and Technological College Dublin (TUD).

Figure 1: Geographical area covered by the North Eastern Regional Eye Care Service

As detailed above, the model of eyecare for Ireland had been outlined in a number of strategic documents. However, while these documents outlined the 'what', they did not support the 'how' or the 'when'. With the establishment of the NERIECS working group, we discussed how to facilitate better collaboration across the region, delivering integrated eyecare to a population across organisational boundaries and professional domains, with a clear purpose and intent to prevent avoidable sight loss.

The NERIECS aim

Our overarching aim was to support hospital and community ophthalmology services, comprising eight organisations in the region, to develop system-level integration of eyecare services. Our focus was to achieve the Sláintecare objectives of equality of access for patients, reduced waiting times for treatment and provision of safe care.

We knew the delivery of sustainable transformation of eyecare services required a unique collaboration between organisations and teams that had not worked or co-operated in this way before. We sought a methodological approach that would allow the team to enable and support staff, service users and providers, where they deemed a redesign of ophthalmology care pathways was necessary, through a collaborative, inclusive and participatory process. The NERIECS working group members were from different clinical, professional and managerial backgrounds, with representation from nursing, medicine, orthoptics, optometry, administration and support staff, and patient representative groups. Several members were experienced Lean Six Sigma practitioners (SPT, AMK, UC), and experienced person-centred practitioners (SPT, AMK), and some were both. We also had an experienced practitioner in effective team interventions (UC). The working group, therefore, took time to consider a combined person-centred Lean Six Sigma approach (Daly et al., 2022; Ward et al., 2022).

Methodology

Williams (2015) and Jorma (2016) cite many and varied quality-improvement initiatives applied in healthcare to improve processes and system management, including Lean, Six Sigma and Lean Six Sigma. The NERIECS working group considered using a combination of person-centred and Lean Six Sigma approaches to prepare for and carry out our improvement work within the region. We proposed that Lean Six Sigma should provide the overall framework for data collection, analysis, planning and scheduling, while person-centred principles would underpin engagement within the working group, with colleagues in the wider ophthalmology team, and with patients and their families.

Lean

The term 'Lean' has been used to describe the philosophy of the Toyota Production System, originally developed in the motor industry (dos Reis Leite and Vieira, 2015). Aherne and Whelton (2010) describe Lean as a quality-improvement approach that consists of the elimination of steps that do not add value in the eyes of the customer (non-value steps) to improve the journey of people, information or goods. In healthcare, Lean methodology recognises there can be both internal customers (for example, a doctor orders an X-ray and becomes a customer of the radiology service) and external customers, (patients, their families and friends). While Lean was developed for industry, it is now widely used in healthcare settings, with noted improvements to patients' experiences of their healthcare journeys, reductions in waiting times for treatment, improved patient outcomes and staff time released for care (Lot et al., 2018; Teeling et al., 2020). Lean has been shown to be adaptable for healthcare process improvement, even in fundamentally different contexts such as the predominantly private system in the US and the NHS in the UK, which provides care that is free at the point of entry (Antony et al., 2019).

Six Sigma

Six Sigma is a statistical and data-driven process-improvement methodology designed to boost process capability and enhance process throughput via the introduction of improvement projects (George et al., 2005; Antony, 2008). Evidence from the application of Six Sigma in healthcare shows improved patient experiences of care in areas including the emergency department (Antony, 2007) and surgery (Greenberg et al., 2007). Of note, this data-driven approach is why some healthcare staff find it difficult (lack of training in data-analysis skills) and time-consuming (time spent collecting and analysing data). Many staff express a preference for Lean, which does not rely on what George and colleagues (2005) call the Six Sigma 'analytical analysis of data'. The staff experience of Six Sigma is supported by Harry (2013), who found that while its data-driven approach provides the statistical evidence for change, there is a potential for what has been called 'analysis paralysis'. This is where a large amount of time and human resources are spent collecting and analysing data instead of focusing on more rapid process improvements that can use Lean. Byrne and colleagues(2007) believe integration between Lean and Six Sigma as an improvement methodology harnesses the best of both approaches and brings many benefits to an organisation, including maximising the quality of day-to-day activities.

Lean Six Sigma

Following the integration of Lean and Six Sigma for project delivery from early 2002 and increased use by 2008, a hybrid termed 'Lean Six Sigma' appears in the healthcare literature from 2010 onwards (Abu Bakar et al., 2015). Where Lean Six Sigma has been used in healthcare settings, it has demonstrated success in certain specific outcomes in relation to identified key performance indicators (Mazzocato et al., 2010; Yeh et al., 2011; Burgess and Radnor, 2013; Teeling et al., 2020), which we have categorised at a high level into outcomes for patients, staff and the organisation (Table 1).

Table 1: High level outcomes of Lean Six Sigma use in healthcare

Group	Outcomes
Patients	• Increased satisfaction with care • Reduced mortality rate • Reduced readmission rate • Feel informed, consulted, respected and involved in their own care
Employees	• Satisfaction with job • Released time to spend with patients • Time for professional development • Reduced unwanted overtime • Feel engaged, consulted and respected
Organisations (as relates to key performance indicators identified in the literature)	• Earlier patient admission • Improved overall waiting times • Improved patient journey time from arrival to triage • Reduced waiting time so see a physician • Reduced waiting time for consultation • Improved discharge rates • Improved length of stay

Supported by the literature on the benefits of Lean Six Sigma and, as discussed, with members who were trained Lean Six Sigma practitioners, the NERIECS working group could see its potential benefits for facilitating preparation for improvement in ophthalmology services. The group, with advice from its person-centred practitioners, could also see the need for a more person-centred approach to the changes required, to avoid the pitfall of using Lean Six Sigma as a decontextualised toolkit (McNamara and Teeling, 2019).

A person-centred approach

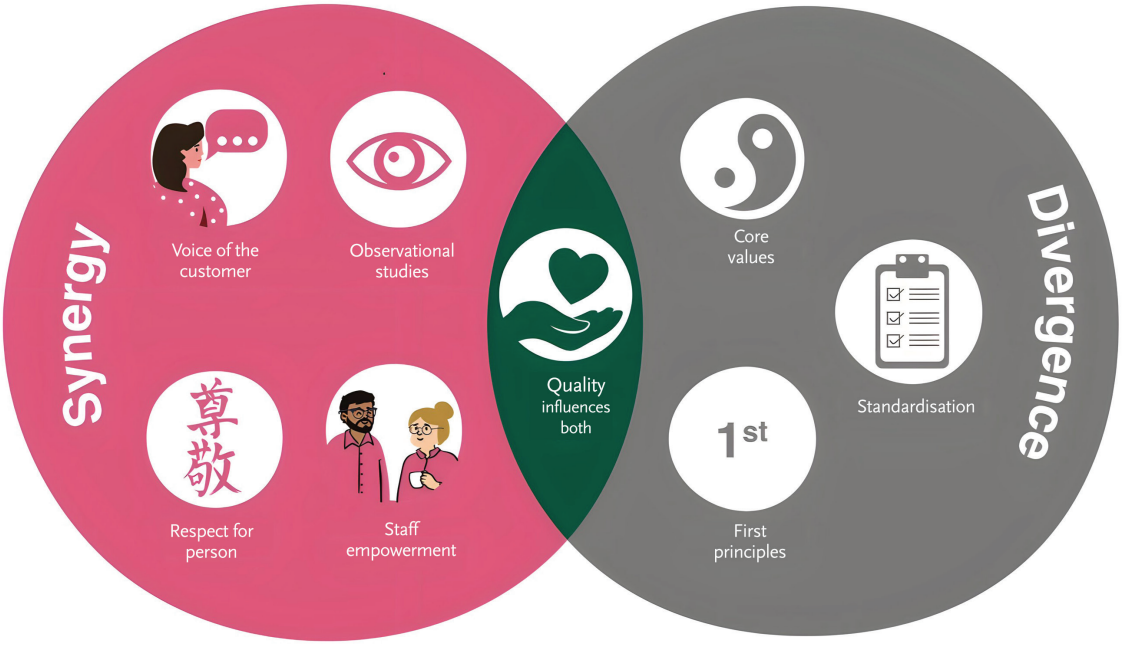
Hardiman and Dewing (2019) discuss the relationship between person-centredness, person-centred care and person-centred cultures, outlining that person-centredness is about embedded practices within a specific type of culture that enable and facilitate the delivery of person-centred care. McCormack and colleagues (2017a) clarify that person-centred cultures are necessary for the delivery of person-centred care. They suggest that person-centred care is about every person involved in the patient's care, not just the patient (McCormack and McCance 2006, 2010; McCormack et al., 2017a). From a staff perspective, it includes skill mix, effective relationships and shared decision making. McCormack and McCance (2010) are clear that the use of the term 'person' in their work encompasses all involved in what they designate 'caring interactions', and therefore is inclusive not just of patients, their families and carers, but of every member of the multidisciplinary healthcare team. To be person-centred, there is a need for 'healthful' relationships between health professionals, their patients or clients and their significant others (McCormack et al., 2015).

Dewing and McCormack (2017a) suggest that, regardless of definition, person-centredness speaks to a specific culture that is inclusive of, and applies to, everyone in an organisation and does not isolate but incorporates care. McCormack and Watson (2018) note that healthcare can often rely exclusively on measurement (metrics), hard evidence and tangible outcomes, which are not necessarily facilitators of person-centredness. As a methodology, Lean Six Sigma has often been applied in an inappropriate technical manner that does not always attend to the cultural dimension. To address this, as researchers, we undertook a combined person-centred Lean Six Sigma approach to the improvement required.

Combined person-centred Lean Six Sigma approach

Recent research (Teeling et al., 2020, 2021) identifies synergies and divergences between Lean Six Sigma and person-centred care. These are represented in Figure 2.

Figure 2. Person-centred Lean Six Sigma model (Teeling et al., 2020)



The rationale behind the model is to guide practitioners in locating where their Lean Six Sigma work is synergistic with person-centred approaches and to pay attention to areas where it might stray from the intent and purpose of improvement. The colours in the model were developed with inspiration from Japanese colour symbolism and meaning (Akal Japanese Academy, 2021).

- The synergy between person-centred and Lean Six Sigma approaches is denoted by the colour pink, which represents a child-like personality, curiosity and openness to the world
- Quality as an influencer is represented by the colour dark green, which depicts fertility, vitality and energy. Quality is the fertile ground between person-centred and Lean Six Sigma approaches to improvement
- The colour silver represents the divergence between person-centred and Lean Six Sigma approaches, denoting security and reliability, and symbolises how Lean Six Sigma practitioners may diverge from potential areas of synergy towards the security and comfort of the familiar, thus moving away from the more curious and open creativity of person-centred approaches

Dewing and McCormack (2015, 2017b) state that service-improvement methodologies such as Lean Six Sigma have what they describe as 'person-centred moments' but that further work is required to strengthen synergies and reconcile areas of divergence to shift towards a person-centred culture. This is corroborated by the findings of the Person-centred Lean Six Sigma model (Teeling et al., 2020). A realist inquiry (Teeling et al., 2021) comprising a realist review and realist evaluation, developed an understanding of how Lean Six Sigma use relates to aspects of organisational culture, an organisation's receptivity to Lean Six Sigma interventions and the self-perception of staff who were Lean Six Sigma practitioners. This inquiry facilitated an understanding of whether, how and in what ways Lean Six Sigma works in the healthcare system. The results of the realist inquiry were aligned to the Person-centred Lean Six Sigma model (Figure 2), which facilitated an increased understanding of whether, how and in what ways a combined model of Lean Six Sigma can enhance efficiency and contribute to the development of person-centred cultures (Teeling et al., 2021).

Since the development of the Person-centred Lean Six Sigma model and the results of the realist inquiry, the combined person-centred Lean Six Sigma approach has been used and has been shown to be effective in single-study sites in public (Connolly et al., 2020; Teeling et al., 2020; 2021), private (Daly et al., 2021, 2022; Ward et al., 2022) and community health (Donegan et al., 2021) settings in Ireland.

However, before 2020, the model had never been tested in a multi-site setting. The NERIECS working group saw its work to improve ophthalmology services as an opportunity to apply the combined approach to maximise the coherence in the underlying philosophy, intention, method and outcomes of Lean Six Sigma and person-centred approaches to process improvement.

Methods

Kaizen 'good change' event

Continuous improvement lies at the core of Lean Six Sigma and is referred to as *Kaizen*, a Japanese word that means 'good change' (Teeling et al., 2020). *Kaizen* is a standard approach to team-based problem solving in Lean, with the improvement conducted by teams to implement change quickly in a specific area (Sperl et al., 2013). The *Kaizen* principle is about striving for improvement through the ongoing involvement of employees in practices that enable them to incrementally propose ideas for improvement, solve problems and sustain results over time (Little et al., 2018).

A *Kaizen* event, as explained by Eaton (2013, p 145) 'focuses the effort of a group of people for a finite period of time on a defined problem, at the end of which something has changed'.

A period of time (up to 10 weeks) is used before any *Kaizen* event to collect, collate and analyse data relating to the area for improvement. A five-day event was planned for June 2021, and all staff working within the region's ophthalmology services were invited. As part of this preparation, the NERIECS working group used the Person-centred Lean Six Sigma model to guide its Lean Six Sigma work. From April 2021 the group began to engage with staff involved in the ophthalmology service using person-centred principles, with an emphasis on working with their beliefs and values about themselves and their work, and engaging authentically to understand their views. We now use the Person-centred Lean Six Sigma model (Figure 2) as a structure to illustrate the methods used in our collaborative work with staff participating in NERIECS.

Respect for person

Person-centredness emphasises the development of person-centred cultures through the use of collaborative, inclusive and participatory (CIP) principles (Manley et al., 2014; Dewing et al., 2015). We wanted to collaborate authentically with the staff involved in ophthalmology services, enabling the purposeful exploration of their extensive knowledge (Beringer and Fletcher, 2011). Based on the findings of the previous research (Teeling et al., 2020, 2021), we knew the factors that staff considered respectful when participating in Lean Six Sigma interventions included:

- Well organised and timely communication
- Openness to new ways of working
- Management actively and visibly supporting and leading on improvement culture
- An explicit focus on staff experience in addition to that of patients
- Staff respect and support for each other when involved in process improvement

From the outset, we ensured that all communication was timely and accessible to all staff via email, notices, briefings, phone calls, and working group and wider team meetings. We purposefully avoided any Lean Six Sigma jargon in our communications, as such jargon is specific to Lean Six Sigma practitioners and highly technical in nature. In addition, jargon is typically considered a counterproductive way to deliver information and undermines people's ability to understand message content (Krieger and Gallois, 2017). To ensure we were available to staff, a dedicated member of the working group was available to answer any questions or to direct them to the correct person. Due to our work beginning during the pandemic, we had to engage staff via a blend of remote and in-person work. There was evidence that the move to virtual platforms for working had increased personal, professional and psychological demands on staff, which they found different from the demands of face-to-face work (Williams, 2021). Therefore we were explicit about when and how meetings, workshops and required training were to be delivered. We opened and closed all our virtual and live interactions with a review

of the CIP principles, emphasising respect for each other, and discussed how we worked and might continue to work together in seeking service improvement. Management from all participating organisations in the region gave their own time and allowed time for staff to attend planning meetings and to engage with the preparation for and participation in the *Kaizen* event. At the forefront of our work were person-centred principles (McCormack and McCance, 2006, 2010; McCormack et al., 2017a) and the tenet that the improvement work was for the benefit of every person involved in patient care, not just the patient.

Voice of the customer

The terminology 'voice of the customer' (VoC) is used in Six Sigma to denote the expectations of the customer (Found and Harrison, 2012). Valuing and respecting the person as an expert in their life experience (National Ageing Research Institute, 2007) is kept to the fore in both Lean and Six Sigma by listening to this voice (Pande et al., 2002). Waring and Bishop (2010) suggest that any re-organisation of healthcare work using improvement methodologies such as Lean should take account of the interactions among, and the mediating effects of, different actors and social structures over time. George and colleagues (2005) suggest that the only way to capture the customer voice is to talk to them, through methods including interviews, focus groups, observational studies and surveys. These methods of gathering requirements from customers are in keeping with person-centred approaches to improving care practices, which use observations, narratives, conversations, focus groups and workshops (Dewing et al., 2015).

We undertook a series of three VoC workshops with staff from across all disciplines within the ophthalmology service. These were held online and facilitated via a virtual platform, each with a duration of four hours. We sought to capture the voice of staff through brainstorming sessions with affinity diagrams (Bullington, 2018), with the intention of generating, organising and categorising a large volume of ideas around focused topics. The project team was able to reflect on these topics through the use of Guba and Lincoln's (1989) fourth-generation evaluation tool. This allowed us to consider participants' claims, concerns and issues, and to examine our own thoughts and experiences of the ophthalmology patient journey, and the experiences of care of patients and staff, to help formulate our aims and objectives. We used several Lean Six Sigma tools that were synergistic with person-centredness (Table 2) to support our reflection and to facilitate understanding of the critical issues for staff, and their level of satisfaction with the current state of the ophthalmology service. We also discussed how we would as a team collectively plan to engage with users of the service and their families to articulate their voices.

Table 2: Lean Six Sigma tools used to facilitate an understanding of staff voice

Tool	Used for	Output
Suppliers, inputs, process, outputs, customers (SIPOC) process map	A first step, to gain a high-level view of the service and the practice areas that staff currently work in (George et al., 2005)	Enabled us to work with staff to develop an understanding of how processes worked/didn't work within the service and specific practice areas
Critical to quality (CTQ) tree	To capture the key measurable characteristics of the process and service, both qualitative and quantitative (George et al., 2005)	Facilitated the translation of staff voice into what they thought were important things to measure, for example, staff satisfaction
Kano model	To classify staff needs for the service into: – Normal needs – Expected needs – Latent needs – Needs they were indifferent to – Needs that were frustrating for them (Gustavsson et al., 2016)	We used this to gather the expectations and motivations of staff who were participating in NERIECS and to understand their values and vision for the service

Staff empowerment

Throughout all our work, we adopted a person-centred approach, respecting the needs, preferences and concerns of individual participants, taking time to listen to their voice, exploring their values and ensuring that as individuals they were empowered to voice concerns and seek solutions (Dewing et al., 2015). In creating conditions to empower individuals to voice concerns and seek solutions, we were cognisant of the collective leadership pillars of performance, safety, wellbeing, team process and sustaining improvement (McAuliffe et al., 2017), which we encapsulated by our ways of working. This collective approach acknowledged the essential requirements of active staff engagement and empowerment in any quality-improvement strategy (Teeling et al., 2021).

Scales and colleagues (2017) suggest that a person-centred approach recognises the need for the acknowledgement of staff knowledge, skills and expertise as integral to empowerment. A specific request from the participating staff was for access to training in Lean Six Sigma process-improvement methodologies. The education and training programme provided by a partner university had been refined and redesigned (McNamara and Teeling, 2019) to emphasise that Lean Six Sigma is more than a set of quality-improvement tools and techniques (Flynn et al., 2018; Teeling, et al., 2020; Wackerbarth et al., 2021). This ensured that the programme had, as recommended, person-centredness as an underpinning philosophy and theory (Cook et al., 2022) as part of using a whole-systems approach (McNamara and Teeling, 2019). There was therefore an emphasis within the partner university curriculum on person-centred improvement. Training in the fundamentals of process improvement was provided to all staff involved in NERIECS who expressed a wish to participate, with 48 staff initially undertaking the one-day programme over a period of two months, with an agreed fee waiver from the training provider.

A key part of the planned improvement work was to process map all the patient pathways. Process mapping supports a better understanding of complex systems and the adaptation of improvement interventions to their local context (Antonacci et al., 2021). Staff felt there was a need for a ‘how to’ guide to support process-mapping activities in their practice areas. Rather than give an off-the-shelf and jargon-heavy guide, the Lean Six Sigma and person-centred practitioners co-designed with staff an easy-access pack that we called ‘process map on the run’. This was designed to be user friendly and support staff working in busy clinical areas.

Observational studies (Gemba)

When developing practice in a person-centred way, observations are often used to study the workplace, not the patients or staff (Dewing et al., 2015). These observations are then fed back to and discussed with staff to inform a practice-development plan. Womack (2013) describes the Lean concept of *Gemba* as paying a visit to the ‘real place’ or where the process or work takes place. The concept of *Gemba* walks (Graban, 2012; Teeling et al., 2021) was developed in Japan to enable staff to stand back from the work and the process and just observe. The mantra, ‘if you can observe you can measure, if you can measure, you can improve’ applies to the walks.

Importantly, a *Gemba* walk is not an opportunity for critique or fault finding of staff. Nor does it seek to enforce policy adherence. It is in no way punitive. Linking back to the essence of the concept of *Kaizen*, a *Gemba* walk is always approached from a place of mutual respect and of making thinking better. The working group, therefore, undertook *Gemba* visits across all participating sites within the region to enable an understanding of how things worked/didn’t work, for staff and patients in specific practice areas.

Quality as an influencer

The research by Teeling and colleagues (2020, 2021) highlights how interpretations of quality can be influenced by both contextual factors and circumstances, and differentiates between the idea of results-focused quality and the concept of a quality culture. We therefore made it explicit in all our meetings and workshops with staff that we were working with CIP principles to aim for improvement

through consensus and culture change (McCormack and Watson, 2018), using Lean Six Sigma as a key component in the development of person-centred care and culture (Dewing et al., 2015) within ophthalmology services. We collectively agreed on an integrative and distributive approach to our improvement, emphasising decision-making by consensus, the objective use of data, mutual understanding and shared ownership of the improvement work, to enable what Cunningham and colleagues (2021, p 13) describe as 'a sense of credibility and logic, psychological safety, a perception of being associated with something that might work and a fear of missing out on the ability to contribute if not present'.

Reconciling divergence between person-centred and Lean Six Sigma approaches

Core values

Understanding the difference between value to the customer and the concept of values as a way of life (McCormack et al., 2017) was important to our work. As indicated, we focused our preparation for the *Kaizen* event on working with staff, not just in looking at 'hard metrics', with an awareness that staff members' intentions, values, ideas and activity shaped their response to service improvement. We were also conscious that the number of sites involved in the improvement meant individuals would be influenced by the different social contexts in which they worked. We found Manley and colleagues' (2011) features of effective healthcare workplace cultures useful in guiding our work with staff, as we focused on:

- Specific values shared by staff in the workplace
- How their values were realised in practice
- How we could adapt, innovate and be creative as a workforce
- Recognising that appropriate change is driven by the needs of patients, services users and communities

Within the working group and wider team, many nurses were skilled in reflective practice. However, we found this was not something widely carried out among other professions. We were aware that within organisational change and development (such as the proposed NERIECS work), reflective practice is highlighted as a central part of the change process (Reynolds and Vince, 2017). We therefore held two sessions on reflective practice, methods and models, facilitated by the person-centred practitioners in the working group. We found reflection was a useful way to highlight the core values and beliefs of staff, and to ensure these were accounted for. Reflection after each stage of the process was facilitated by Rolfe's (2001) model, a reflective tool found to be user friendly by staff (Table 3). The tool highlights areas for learning and development. It was particularly useful for the working group itself, as it enabled us to consider each interaction with staff so we could reflect individually and as a group.

Table 3: What, so what, now what questions

Stage	Details
What?	Describe the situation – achievements, consequences, responses, feelings and problems
So what?	Discuss what has been learned – learning about self, relationships, models, attitudes, cultures, actions, thoughts, understanding and improvements
Now what?	Identify what needs to be done in order to improve future outcomes and develop learning

The working group members agreed to use reflective diaries/journals as a method to reflect on our own practice.

First principles and standardisation

We were aware that there was a divergence between the concept of understanding value as a first principle of Lean (Williams, 2015; Teeling et al., 2020, 2021) and the imperative of person-centred

care to attend to professional competence, to commit to ethical practice and to clarify beliefs and values (William, 2015). We also understood that there was a dichotomy between the need for process standardisation in ophthalmology services and the wishes of staffs to deliver more holistic, individualised care. The offering of process-improvement training enabled us to address these divergences between Lean Six Sigma and person-centred approaches, and help staff understand that it is possible to use both methodologies together to provide person-centred, holistic and individualised care (Morgan and Yoder, 2012) and to judge when patient care requires diversity (Saurin et al., 2013), while recognising where process standardisation could be useful and benefit outcomes (McGrath et al., 2019; Teeling et al., 2021).

Findings

Four main themes emerged from our workshops and sessions with staff to bring forward to the *Kaizen* event. These related to place, people, procurement and patients.

Place

Staff referred to place as an important theme for them. Within this, they predominantly spoke about the environment in which patients received care and the space they as practitioners had to work in. The working environment for staff, both physical and cultural, has been identified as strongly associated with retention and recruitment (Kutney-Lee et al., 2013). The space and flow within a working environment have also been linked to a reduction in healthcare-acquired infection, adverse events (Braithwaite et al., 2017) and patient readmission to the service (Lasater and McHugh, 2016). Staff, therefore, felt that a focus on the working environment and space would be important for the *Kaizen* event and for any improvement goals. *Gemba*, which had been carried out by the working group members, had enabled us to understand staff frustrations first hand, to corroborate the voice of the customer, engage with service users and see the environment of care within specific practice areas.

People

While staff recognised the importance of attempting to improve quality within the ophthalmology service, they saw attention to their wellbeing, conditions of work and values and opinions as a priority. Wellbeing issues were interlinked with the theme of place, but importantly they were also linked to staff concerns that a focus solely on patient outcomes, as opposed to patient and staff experiences of care, would be the driver for the improvement. Prior to the research by Teeling and colleagues (2020, 2021), almost every case in the literature on Lean Six Sigma in healthcare discussed process improvement in terms of patient care outcomes (Mazzocato et al., 2010; Poksinska, 2010; Holden, 2011). Few studies considered the impact on staff, their attitudes to Lean Six Sigma or its effect on their work. There was therefore consensus among stakeholders that staff wellbeing would be central to any improvement, with the knowledge that greater staff satisfaction would influence patient outcomes (Kirwan et al., 2013; Carayon et al., 2014).

Procurement

Staff indicated that to enable improvement for patients, they would ideally be seen in the community rather than the acute hospital setting where possible. For patients to be seen locally in community units, there was a requirement for installation, commissioning and testing of equipment, notably an optical coherence tomography scanner (commonly referred to as an OCT scanner) to view the health of patients' eyes in greater detail, as well as a colour camera, visual fields tester and biometry. The housing of the equipment was again interlinked to the theme of place, and another important component was staff training and education on any new equipment, respecting their learning needs and allowing time to be competent and confident in its use. We found that a key point of the procurement theme was the integration/linking of disparate patient IT systems in the ophthalmology units to facilitate cohesive oversight of patient care by the specialist teams where necessary.

Patients

All of the above themes fed into the theme of the patient. Staff had a vision for a future state within the region where patients received the right treatment, at the right time and in the right place; a vision where the necessary staff and equipment were available to deliver safe care. It was evident from the literature that there was no active evidence of patients' and families' active inclusion in Lean Six Sigma projects with a predominant focus on patient outcomes (Deblois and Lepanto, 2016; Teeling et al., 2020, 2021), although some more recent literature in Ireland has been inclusive of families and carers (Connolly et al., 2020; Teeling et al., 2020; Donegan et al., 2021). Staff strongly expressed that any redesign of pathways should enable patients to access care in the appropriate setting for their needs, and that patients should be directly involved in customer voice workshops to give them an active part in the design of their own care. The working group also saw this as an indication that in addition to patient representative groups, it should actively seek membership from patients of the ophthalmology service.

Ways of working

We found that through our use of a combined person-centred and Lean Six Sigma approach, we were able to ensure data collection and analysis were underpinned by person-centred principles that have been illustrated as effective and acceptable ways of capturing the experiences of participants (Prior et al., 2020) and of facilitating authentic collaboration (Beringer et al., 2011). The person-centred approach and methods facilitated a reflection space for the participants. The integrated approach enabled staff to work in ways that provided evidence to support the development of quality, person-centred care that takes account of the outcomes for, and experiences of, ophthalmology patients, their families and staff.

Discussion

To support hospital and community ophthalmology services in the North East Region and prepare for the development of a system-level integration of eyecare services, we used a combined Lean Six Sigma and person-centred approach to support staff to develop a shared vision of change to support the delivery of service improvement. While the effectiveness of Lean Six Sigma in achieving process improvement is well documented in the literature, there is little work on a combined Lean Six Sigma person-centred approach (Teeling et al., 2020, 2021). From the working group's perspective, we knew that *Kaizen* was an ideal method to bring staff together from across the ophthalmology service for a week-long collaborative process-improvement event. However, with our knowledge of Lean Six Sigma, we were aware that this short and intense focus on process improvement had the potential to ignore the individual and personal principles underpinning the concept of *Kaizen*, which requires attention to employees' working and social lives (Suárez Barraza et al., 2011). We therefore saw a rationale for choosing a combined Lean Six Sigma and person-centred approach to prepare for the event in the first instance, and to underpin our work from the formation of NERIECS and beyond. This ensured that although we kept the patient's view paramount in determining healthcare quality, we knew the importance of including the views of the healthcare professionals who worked in the ophthalmology service and who knew the culture (Gustavsson et al., 2016).

Given the importance of improving the ophthalmology service for both patients and staff, we were aware that the introduction of NERIECS during the pandemic risked being seen as adding more work – a risk associated with Lean Six Sigma in industry from the outset (Teeling et al., 2020). While this potential pitfall does not relate specifically to the application of Lean Six Sigma in a healthcare setting, we felt that attention to the wellbeing, conditions of work and perceptions of staff was a priority (Holden et al., 2015).

We found that taking a bottom-up approach to designing the NERIECS improvement, with staff rather than management taking the lead, meant staff felt more consulted and empowered (Graban, 2012). Staff actually had a say in the nature and direction of the service improvement and direction of travel.

Following the initial *Kaizen* event in June 2021, five pathways for improvement were identified by staff as priorities:

- Cataract
- Glaucoma
- Acute macular degeneration
- Paediatric amblyopia
- Eye emergency

To support ongoing improvement, underpinned by person-centred principles, structures and systems have been formed to enable staff and patient engagement and support sustainable change. These include the development of NERIECS as a virtual accountable care organisation (VACO), which is unique in Irish healthcare. A VACO is a group of providers (for example, hospitals, community health organisations and others involved in patient care) that work together to coordinate care and manage chronic disease (Beckman et al., 2020). This structure has facilitated NERIECS to locate resources (funding, staff) to more actively consult and involve patients and staff in relation to ophthalmology pathway improvement work. Patient representation is actively sought for the VACO.

Conclusion

This was the first use of a combined Lean Six Sigma and person-centred approach to improvement in a multi-site setting, internationally. Given the complexity of the environment in healthcare and its continuous drive for improvement, there is the potential for staff to perceive Lean and process improvement as another 'fad' (McIntosh and Cookson, 2012) or extra work (Flynn et al., 2018; Teeling et al., 2020, 2021). We believe that Lean Six Sigma improvement work must acknowledge the work staff do, show respect for them and their work, and not jump to solutions using a toolkit approach. Instead, in undertaking Lean Six improvement work, healthcare organisations can benefit from adopting a person-centred improvement approach that seeks a deep understanding of the values, beliefs, habits and routines of their staff.

We contend that the use of the Person-centred Lean Six Sigma model as a framework meant staff were more open to new and creative ways of working, and to the adoption of an innovative model of improvement that has the potential to promote quality and contribute to the development of a person-centred culture (Teeling et al., 2020, 2021). Our approach aimed to support employees through organisational assistance, respect and access to training (Joosten et al., 2009). We made it explicit that the model of improvement was based on an understanding that Lean Six Sigma is more than a set of quality-improvement tools and techniques (Flynn et al., 2018; McNamara and Teeling, 2019; Teeling et al., 2020, 2021; Wackerbarth et al., 2021). Rather, we emphasised the person-centred synergies of Lean Six Sigma, recognising that our intent was to value people and seek to clarify their beliefs and values (William, 2015). Importantly, it enabled us to support staff in the hospital and community ophthalmology services to prepare for the development of a system-level integration of eyecare services.

Implications for practice

- An integrated approach to process improvement in healthcare is shown to be effective beyond a single study site, across geographic and organisational boundaries, and across levels of care (primary, secondary, tertiary and post acute)
- This work illustrates the importance of creating a shared vision across clinical services and highlights the importance and value of process improvement and person-centred approaches used collectively in delivering safe, effective and collaborative care in meaningful ways
- The work makes a valuable contribution to a developing body of knowledge on combining Lean Six Sigma and person-centred approaches in improvement

References

Abu Bakar, F.A., Subari, K. and Mohd Daril, M.A. (2015) Critical success factors of Lean Six Sigma deployment: a current review. *International Journal of Lean Six Sigma*. Vol. 6. No. 4. pp 339-348. https://doi.org/10.1108/IJLSS-04-2015-0011.

Aherne, J. and Whelton, J. (2010) *Applying Lean in Healthcare: A Collection Of International Case Studies*. New York: Productivity Press.

Akal Japanese Academy (2021) *Different Colours in Japanese Language. Shades, Meaning and Symbolism.* Retrieved from: japan-academy.in/blog/colors-in-japanese (Last accessed 12th February 2023).

Antonacci, G., Lennox, L., Barlow, J., Evans, L. and Reed, J. (2021) Process mapping in healthcare: a systematic review. *BMC Health Services Research*. Vol. 21. No. 1. Article 342. https://doi.org/10.1186/s12913-021-06254-1.

Antony, J. (2007) Six Sigma: a strategy for supporting innovation in pursuit of business excellence – invited paper. *International Journal of Technology Management*. Vol. 37. Nos. 1-2. pp 8-12. https://doi.org/10.1504/IJTM.2007.011800.

Antony, J. (2008) What is the role of academic institutions for the future development of Six Sigma? *International Journal of Productivity and Performance Management*. Vol. 57. No. 1. pp 107-110. https://doi.org/10.1108/17410400810841263.

Antony, J., Vijaya Sunder, M., Sreedharan, R., Chakraborty, A. and Gunasekaran, A. (2019) A systematic review of Lean in healthcare: a global perspective. *International Journal of Quality and Reliability Management*. Vol. 36. No. 8. pp 1370-1391. https://doi.org/10.1108/IJQRM-12-2018-0346.

Beckman, A. , Mechanic, R., Shah, T. and Figueroa, J. (2021). Accountable care organizations during Covid-19: routine care for older adults with multiple chronic conditions. *Healthcare*. Volume 9, No. 1. pp. 100511. https://doi.org/10.1016/j.hjdsi.2020.100511.

Beringer, A. and Fletcher, M. (2011) Developing practice and staff: enabling improvement in care delivery through participatory action research. *Journal of Child Health Care.* Vol. 15. No. 1. pp 59-70. https://doi.org/10.1177/1367493510395639.

Braithwaite, J., Herkes, J., Ludlow, K., Testa, L. and Lamprell, G. (2017) Association between organisational and workplace cultures, and patient outcomes: systematic review. *BMJ Open*. Vol. 7. No. 11. e017708. https://doi.org/10.1136/bmjopen-2017-017708.

Bullington, K. (2018) Sticking out the storm. *Quality Progress*. Vol. 51. No. 9. pp 24-32.

Burgess, N. and Radnor, Z. (2013) Evaluating Lean in healthcare. *International Journal of Health Care Quality Assurance*. Vol. 26. No. 3. pp 220-235. https://doi.org/10.1108/09526861311311418.

Byrne, G., Lubowe, D. and Blitz, A. (2007) Using a Lean Six Sigma approach to drive innovation. *Strategy and Leadership*. Vol. 35. No. 2. pp 5-10. https://doi.org/10.1108/10878570710734480.

Carayon, P., Wetterneck, T., Rivera-Rodriguez, A., Hundt, A., Hoonakker, P., Holden, R. and Gurses, A. (2014) Human factors systems approach to healthcare quality and patient safety. *Applied Ergonomics.* Vol. 45. No. 1. pp 14-25. https://doi.org/10.1016/j.apergo.2013.04.023.

Connolly, K., Teeling, S.P. and McNamara, M. (2020) Live well after stroke. *International Practice Development Journal*. Vol. 10. No. 2. Article 5. pp 1-16. https://doi.org/10.19043/ipdj.102.005.

Cook, N., Brown, D., O'Donnell, D., McCance, T., Dickson, C., Tønnessen, S., Dunleavy, S., Lorber, M., Falkenberg, H., Byrne, G. and McCormack, B. (2022) The Person-centred curriculum framework: a universal curriculum framework for person-centred healthcare practitioner education. *International Practice Development Journal*. Vol. 12. Suppl. Article 4. pp 1-11. https://doi.org/10.19043/12Suppl.004.

Cunningham, U., De Brún, A., Willgerodt, M., Abu-Rish Blakeney, E. and McAuliffe, E. (2021) A realist evaluation of team interventions in acute hospital contexts: use of two case studies to test initial programme theories. *International Journal of Environmental Research and Public Health*. Vol. 18. No. 16. Article 8604. https://doi.org/10.3390/ijerph18168604.

Daly, A., Wolfe, N., Teeling, S.P., Ward, M. and McNamara, M. (2021) Redesigning the process for scheduling elective orthopaedic surgery: a combined Lean Six Sigma and person-centred approach. *International Journal of Environmental Research and Public Health*. Vol. 18. No. 22. Article 11946. http://doi.org/10.3390/ijerph182211946.

Daly, A., Teeling, S.P., Garvey, S., Ward, M. and McNamara, M. (2022) Using a combined Lean and person-centred approach to support the resumption of routine hospital activity following the first wave of COVID-19. *International Journal of Environmental Research and Public Health*. Vol. 19. No. 5. Article 2754. http://doi.org/10.3390/ijerph19052754.

Deblois, S. and Lepanto, L. (2016) Lean and Six Sigma in acute care: a systematic review of reviews. *International Journal of Health Care Quality Assurance*. Vol. 29. No. 2. pp 192-208. https://doi.org/10.1108/IJHCQA-05-2014-0058.

Dewing, J., McCormack, B. and Titchen, A. (2015) *Practice Development for Nursing, Health, and Social Care Teams*. New Jersey, US: John Wiley & Sons.

Dewing, J. and McCormack, B (2017a) Editorial: tell me, how do you define person-centredness? *Journal of Clinical Nursing*. Vol. 26. Nos. 17-18. pp 2509-2510. https://doi.org/10.1111/jocn.13681.

Dewing, J. and McCormack, B. (2017b) *From Clinical Pathways to Person Pathways – A Masterclass*. Paper presented at Service Improvement Masterclass, 26th August 2017. Dublin: Ireland East Hospital Group.

Donegan, D., Teeling, S.P., McNamara, M., McAweeney, E., McGrory, L. and Mooney, R. (2021) How collaborative working reduced older persons' length of stay in acute care and increased home discharge: calling time on the 'dance of the blind reflex'. *International Practice Development Journal.* Vol. 11. No. 1. Article 4. pp 1-14. https://doi.org/10.19043/ipdj.111.004.

dos Reis Leite, H. and Vieira, G. (2015) Lean philosophy and its applications in the service industry: a review of the current knowledge. *Production.* Vol. 25. No. 3. pp 529-541. https://doi.org/10.1590/0103-6513.079012.

Eaton, M. (2013) *The Lean Practitioners Handbook*. London: Kogan Page.

Flynn, R., Newton, A., Rotter, T., Hartfield, D., Walton, S., Fiander, M. and Scott, S. (2018) The sustainability of Lean in paediatric healthcare: a realist review. *Systematic Reviews*. Vol. 7. No. 1. Article 137. https://doi.org/10.1186/s13643-018-0800-z.

Found, P. and Harrison, R. (2012) Understanding the lean voice of the customer. *International Journal of Lean Six Sigma*. Vol. 3. No. 3. pp 251-267. https://doi.org/10.1108/20401461211282736.

George, M., Rowlands, D., Price, M. and Maxey, J. (2005) *The Lean Six Sigma Pocket Toolbox*. London: McGraw-Hill.

Government of Ireland (2022) *Sláintecare Implementation Strategy and Action Plan, 2021-2023.* Dublin: Department of Health. Retrieved from: tinyurl.com/slaintecare-ie. (Last accessed 20th February 2023).

Graban, M. (2012) *Lean Hospitals – Improving Quality, Patient Safety, and Employee Engagement* (2nd edition). Boca Raton, US: CRC Press.

Greenberg, C., Regenbogen, S., Studdert, D., Lipsitz, S., Rogers, S., Zinner, M. and Gawande, A. (2007) Patterns of communication breakdowns resulting in injury to surgical patients. *Journal of the American College of Surgeons*. Vol. 204. No. 4. pp 533-540. https://doi.org/10.1016/j.jamcollsurg.2007.01.010.

Guba, E. and Lincoln, Y. (1989) *Fourth Generation Evaluation*. London: Sage.

Gustavsson, S., Gremyr, I. and Kenne Sarenmalm, E. (2016) Using an adapted approach to the Kano model to identify patient needs from various patient roles. *Total Quality Management Journal.* Vol. 28. No. 1. pp 151-162. https://doi.org/10.1108/TQM-04-2013-0050.

Hardiman, M. and Dewing, J. (2019) Using two models of workplace facilitation to create conditions for development of a person-centred culture: a participatory action research study. *Journal of Clinical Nursing*. Vol. 28. Nos. 15-16. pp 2769-2781. https://doi.org/10.1111/jocn.14897.

Harry, M. (2013) *Avoiding Analysis Paralysis*. Retrieved from: tinyurl.com/harry-analysis. (Last accessed 27th December 2022).

Health Services Executive Ireland (2017) *Health Services Executive Primary Eye Care Services Report*. Retrieved from: tinyurl.com/HSEI-eyecare. (Last accessed 20th February 2023).

Holden, R. (2011) Lean thinking in emergency departments: a critical review. *Annals of Emergency Medicine*. Vol. 57. No. 3. pp 265-278. https://doi.org/10.1016/j.annemergmed.2010.08.001.

Holden, R., Eriksson, A., Andreasson, J., Williamson, A. and Dellve, L. (2015) Healthcare workers' perceptions of lean: a context-sensitive, mixed methods study in three Swedish hospitals. *Applied Ergonomics*. Vol. 47. pp 181-192. https://doi.org/10.1016/j.apergo.2014.09.008.

Irish College of Ophthalmologists (2017) *National Clinical Programme for Ophthalmology Model of Eye.* Retrieved from: tinyurl.com/ICO-eye-model. (Last accessed 20th February 2023).

Joosten, T., Bongers, I. and Janssen, R. (2009) Application of lean thinking to health care: issues and observations. *International Journal for Quality in Health Care.* Vol. 21. No. 5. pp 341-347. https://doi.org/10.1093/intqhc/mzp036.

Jorma, T., Tiirinki, H., Bloigu, R. and Turkki, L. (2016) LEAN thinking in Finnish healthcare. *Leadership in Health Services*. Vol. 29. No. 1. pp 9-36. https://doi.org/10.1108/LHS-08-2015-0021.

Kirwan, M., Matthews, A. and Scott, P. (2013) The impact of the work environment of nurses on patient safety outcomes: a multi-level modelling approach. *International Journal of Nursing Studies.* Vol. 50. No. 2. pp 253-263. https://doi.org/10.1016/j.ijnurstu.2012.08.020.

Krieger, J. and Gallois, C. (2017) Translating science: using the science of language to explicate the language of science. *Journal of Language and Social Psychology*. Vol. 36. No. 1. pp 3-13. https://doi.org/10.1177/0261927X16663256.

Kutney-Lee, A., Wu, E., Sloane, D. and Aiken, L. (2013) Changes in hospital nurse work environments and nurse job outcomes: an analysis of panel data. *International Journal of Nursing Studies*. Vol. 50. No. 2. pp 195-201. https://doi.org/10.1016/j.ijnurstu.2012.07.014.

Lasater, K. and McHugh, M. (2016) Nurse staffing and the work environment linked to readmissions among older adults following elective total hip and knee replacement. *International Journal for Quality in Health Care*. Vol. 28. No. 2. pp 253-258. https://doi.org/10.1093/intqhc/mzw007.

Little, C., McStay, C., Oeth, J., Koehler, A. and Bookman, K. (2018) Using rapid improvement events for disaster after-action reviews: experience in a hospital information technology outage and response. *Prehospital and Disaster Medicine*. Vol. 33. No. 1. pp 98-100. https://doi.org/10.1017/S1049023X17007191.

Lot, L.T., Sarantopoulos, A., Min, L.L., Perales, S.R., Boin, I.F. and Ataide, E.C. (2018) Using Lean tools to reduce patient waiting time. *Leadership in Health Services*. Vol. 31. No. 3. pp 343-351. https://doi.org/10.1108/LHS-03-2018-0016.

Manley, K., Sanders, K., Cardiff, S. and Webster, J. (2011) Effective workplace culture: the attributes, enabling factors and consequences of a new concept. *International Practice Development Journal*. Vol. 1. No. 2. Article 1. pp 1-29. Retrieved from: fons.org/library/journal/volume1-issue2/article1 (Last accessed 24th April 2023).

Manley, K., O'Keefe, H., Jackson, C., Pearce, J. and Smith, S. (2014) Shared purpose framework to deliver person-centred, safe and effective care: organisational transformation using practice development methodology. *International Practice Development Journal*. Vol. 4. No. 1. Article 2. pp 1-31. https://doi.org/10.19043/ipdj.41.002.

Mazzocato, P., Savage, C., Brommels, M., Aronsson, H. and Thor, J. (2010) Lean thinking in healthcare: a realist review of the literature. *BMJ Quality and Safety in Health Care.* Vol. 19. No. 5. pp 376-382. https://doi.org/10.1136/qshc.2009.037986.

McAuliffe, E., De Brún, A., Ward, M., O'Shea, M., Cunningham, U., O'Donovan, R., McGinley, S., Fitzsimons, J., Corrigan, S. and McDonald, N. (2017) Collective leadership and safety cultures (Co-Lead): protocol for a mixed-methods pilot evaluation of the impact of a co-designed collective leadership intervention on team performance and safety culture in a hospital group in Ireland. *BMJ Open.* Vol. 7. No. 11. e017569. https://doi.org/10.1136/bmjopen-2017-017569.

McCormack, B. and McCance, T. (2006) Development of a framework for person-centred nursing. *Journal of Advanced Nursing.* Vol. 56. No. 5. pp 472-479. https://doi.org/10.1111/j.1365-2648.2006.04042.x.

McCormack, B. and McCance, T. (2010) *Person-centred Nursing: Theory and Practice*. New Jersey, US: Wiley-Blackwell.

McCormack, B., Borg, M., Cardiff, S., Dewing, J., Jacobs, G., Janes, N., Karlsson, B., McCance, T., Mekki, T.E., Porock, D., van Lieshout, F. and Wilson, V. (2015) Person-centredness – the 'state' of the art. *International Practice Development Journal.* Vol. 5. Suppl. Article 3. pp 1-15. https://doi.org/10.19043/ipdj.5SP.003.

McCormack, B., McCance, T. and Klopper, H. (2017a) *Person-centred Practice in Nursing and Health Care: Theory and Practice*. (2nd edition). New Jersey, US: Wiley-Blackwell.

McCormack, B., Dulmen, S., Eide, H., Eide, T. and Skovdahl, K. (2017b) *Person-centred Healthcare Research* (1st edition). Chichester, UK: Wiley-Blackwell.

McCormack, B. and Watson, R. (2018) Values, virtues and initiatives—time for a conversation. *Journal of Advanced Nursing*. Vol. 74. pp 753-754. https://doi.org/10.1111/jan.13352.

McGrath, K., Casserly, M., O'Mara, F., Muslow, J., Shields, C., Staunton, O., Ward, M. and Teeling, S.P. (2019) Zap it track it: the application of Lean Six Sigma methods to improve the screening system of low-grade mucinous neoplasms of the appendix in an acute hospital setting. *International Journal for Quality in Health Care*. Vol. 31. Suppl. 1. pp 35-44. https://doi.org/10.1093/intqhc/mzz075.

McIntosh, B. and Cookson, G. (2012) Lean management in the NHS: fad or panacea. *British Journal of Healthcare Management*. Vol. 18. No. 3. pp 130-135. https://doi.org/10.12968/bjhc.2012.18.3.130.

McNamara, M. and Teeling, S.P. (2019) Developing a university-accredited Lean Six Sigma curriculum to overcome system blindness. *International Journal for Quality in Health Care*. Vol. 31. Suppl. 1. pp 3-5. https://doi.org/10.1093/intqhc/mzz074.

Morgan, S. and Yoder, L. (2012) A concept analysis of person-centered care. *Journal of Holistic Nursing*. Vol. 30. No. 1. pp 6-15. https://doi.org/10.1177/0898010111412189.

National Ageing Research Institute (2007) *What is Person-centred Health Care: Research Review and Practice Perspectives.* Melbourne: National Ageing Research Institute. Retrieved from tinyurl.com/NARI-person-centred. (Last accessed: 30th March 2023).

National Treatment Purchase Fund (2022) *Outpatient Waitlists.* Retrieved from: tinyurl.com/NTPF-waitlists. (Last accessed 18th February 2023).

Pande, P., Neuman, R. and Cavanagh, R. (2002) *The Six Sigma Way Team Fieldbook: An Implementation Guide for Process Improvement*. New York: McGraw-Hill.

Panteli, D. (2020) *How are Countries Reorganizing Non-COVID-19 Health Care Service Delivery?* Brussels: European Observatory on Health Systems and Policies. Retrieved from: tinyurl.com/Pantelli-HSRM. (Last accessed 24th April 2023).

Poksinska, B. (2010) The current state of Lean implementation in health care: literature review. *Quality Management in Health Care*. No. 19. Vol. 4. pp 319-329. https://doi.org/10.1097/QMH.0b013e3181fa07bb.

Prior, S., Mather, C., Ford, K., Bywaters, D. and Campbell, S. (2020) Person-centred data collection methods to embed the authentic voice of people who experience health challenges. *BMJ Open Quality.* Vol. 9. e000912. https://doi.org/10.1136/bmjoq-2020-000912.

Reynolds, M. and Vince, R. (2017) *Organizing Reflection*. Aldershot, UK: Ashgate Publishing.

Rolfe, G., Freshwater, D. and Jasper, M. (2001) *Critical Reflection for Nursing and the Helping Professions: A User's Guide*. London: Palgrave.

Saurin, T., Rooke, J. and Koskela, L. (2013) A complex systems theory perspective of Lean production. *International Journal of Production Research*. Vol. 51. No. 19. pp 5824-5838. https://doi.org/10.1080/00207543.2013.796420.

Scales, K., Bailey, S., Middleton, J. and Schneider, J. (2017) Power, empowerment, and person-centred care: using ethnography to examine the everyday practice of unregistered dementia care staff. *Sociology of Health and Illness*. Vol. 39. No. 2. pp 227-243. https://doi.org/10.1111/1467-9566.12524.

Sperl, T., Ptacek, R. and Trewn, J. (2013) *Practical Lean Six Sigma for Healthcare*. Chelsea, US: MCS Media.

Suárez-Barraza, M., Ramis-Pujol, J. and Kerbache, L. (2011) Thoughts on *Kaizen* and its evolution. *International Journal of Lean Six Sigma.* Vol. 2. No. 4. pp 288-308. https://doi.org/10.1108/20401461111189407.

Teeling, S.P., Dewing, J. and Baldie, D. (2020) A discussion of the synergy and divergence between Lean Six Sigma and person-centred improvement sciences. *International Journal of Research in Nursing*. Vol. 11. No. 4. pp 10-23. https://doi.org/10.3844/ijrnsp.2020.10.23.

Teeling, S.P., Dewing, J. and Baldie, D. (2021) A realist inquiry to identify the contribution of Lean Six Sigma to person-centred care and cultures. *International Journal of Environmental Research and Public Health*. Vol. 18. No. 19. Article 10427. https://doi.org/10.3390/ijerph181910427.

Wackerbarth, S.B., Bishop, S.S. and Aroh, A.C. (2021) Lean in healthcare: time for evolution or revolution? *Journal for Healthcare Quality.* Vol. 43. No. 1. pp 32-38. https://doi.org/10.1097/JHQ.0000000000000253.

Ward, M., Daly, A., McNamara, M., Garvey, S. and Teeling, S.P. (2022) A case study of a whole system approach to improvement in an acute hospital setting. *International Journal of Environmental Research and Public Health*. Vol. 19. No. 3. Article 1246. https://doi.org/10.3390/ijerph19031246.

Waring, J. and Bishop, S. (2010) Lean healthcare: rhetoric, ritual and resistance. *Social Science and Medicine*. Vol. 71. No. 7. pp 1332-1340. https://doi.org/10.1016/j.socscimed.2010.06.028.

Webb, E., Hernandez-Quevedo, C., Scarpetti, G. and Edwards, N. (2020) Restarting more routine hospital activities during COVID-19: approaches from six countries. *Eurohealth.* Vol. 26. No. 2. pp 68-72. Retrieved from: tinyurl.com/Eurohealth-20-26-2. (Last accessed 20th February 2023).

Williams, N. (2021) Working through COVID-19: 'Zoom' gloom and 'Zoom' fatigue. *Occupational Medicine*. Vol. 71. No. 3. pp 164-164. https://doi.org/10.1093/occmed/kqab041.

Williams, S. (2015) *Lean and Person-centred Care: Are they at Odds?* Retrieved from: tinyurl.com/Williams-lean. (Last accessed 27th November 2022)

Womack, J. (2013) *Gemba Walks*. (2nd edition). Boston, US: Lean Enterprise Institute.

Yeh, H.-L., Lin, C.-S., Su, C.-T. and Wang, P.C. (2011) Applying LSS to improve healthcare: an empirical study. *African Journal of Business Management*. Vol. 5. No. 31. pp 12356-12370. https://doi.org/10.5897/AJBM11.1654.

Acknowledgements

We would like to acknowledge the commitment, compassion and dedication of all our colleagues working in ophthalmology services in the North East Region of Ireland and who give so fully of their valuable time to NERIECS. We thank them for their support in creating a platform for collaborative improvement. We thank the Mater Lean Academy and Mater Transformation for their support of this work and the provision of training to staff working within NERIECS. Finally, we thank Alan MacFarlane for his update of the Person-centred Lean Six Sigma model and his amazing design work.

Seán Paul Teeling (PhD, MBA, BSc, BA, HDip Nursing, Grad Dip Lean Six Sigma, RN, RCN), Assistant Professor Health Systems, Programme Director Professional Cert|Graduate Cert Process Improvement in Health Systems, UCD and Mater Misericordiae University Hospital, Dublin, Ireland.

Anne-Marie Keown (MSc, BSc Hons Physiotherapy), Director of System Integration and Redesign, Mater Misericordiae University Hospital, Dublin, Ireland.

Úna Cunningham (PhD, BSc Clin Lang), Head of Transformation| Executive Lead, Strategic Projects, Mater Misericordiae University Hospital, Dublin, Ireland.

David Keegan (PhD, LRCP&SI, MB, BCh, BAO), Clinical Professor of Ophthalmology and Retina, Mater Misericordiae University Hospital and UCD, Dublin, Ireland.