

Adapting Lean for process redesign in senior day care services

Huay Ling Tay[^]

School of Business, Singapore University of Social Sciences, Singapore, Singapore

Correspondence to: Huay Ling Tay, PhD, 463 Clementi Road, Singapore 599494, Singapore. Email: hltay@suss.edu.sg.

Background: The paper features the findings from a case-study research that adapted Lean thinking for process redesign in the senior day care centres. The aim is to extend understanding in the adaptation of lean in the community care contexts by addressing the research question: “How can Lean be adapted to senior day care services for process redesign?”

Methods: A qualitative case-based research approach using two senior day-care centres was conducted to allow for in-depth understanding of the adaptation of Lean in the community care contexts. Data sources included semi-structured interviews, focused group discussions, field notes from site observations, and follow up analyses of centre-based operations parameters that are tracked regularly.

Results: The findings revealed that activities that are not directly related to the core elder care activities took up to 30% of the time in the daily routine of an average care staff at the senior day care centres. These activities include kitchen chores such as food preparation and general cleaning that distracted care staff from core activities. To allow the care staff to focus on core care activities, the study suggested options to engage external service providers through the procurement of long-term service contracts for non-care activities.

Conclusions: Our study fills the research gap where the operations and work processes of senior day care services are relatively less examined. The findings and discussions provide guidance for seniors care providers, community care administrators and healthcare policy makers to evaluate and improve their existing processes using Lean. This paper also highlighted important factors that support the adaptation of Lean in senior day care and community care organizations.

Keywords: Lean; process design; senior day-care; case study

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Introduction

The developed world's population is aging, due to trends of increased life expectancies and decreased fertility rates. Like many Asian countries, Singapore is facing a key demographic challenge with its rapidly aging society, driven by rising life expectancies and declining fertility rates. Lower fertility rates and increased longevity mean that the number of seniors is expected to double to over 900,000, or 1 in 4 Singaporeans by the year 2030 (1).

One of the nation's solutions to this social problem is the long-term care support scheme for older persons, including housework and physical activity support community care

centre facilities such as the senior day care centres helps community-dwelling elderly to manage disability, frailty, and multi-morbidity (2). We ground this paper in senior day care centres, where community-based facilities provide case management and a variety of day care activities to cater for a range of elders with differing levels of needs. In contrast to primary care hospital settings, which are mostly focused on acute and short term treatments, the primary objectives of senior day care centres are to improve the quality of life of seniors and delay institutionalization (3,4). There are, therefore, important contextual distinctions that can have implications on how Lean should be adapted to aid in the

[^] ORCID: 0000-0002-2462-3240.

Table 1 Five key principles of Lean (15)

Identify customers and specify value	This principle acknowledges that only a small proportion of the time and effort in any organization adds value for the customer. Value for a specific product or service must be clearly defined from the customer's perspective. Non-value activities are considered "waste" and targeted for removal
Identify and map the value stream	The value stream represents the whole set of activities across all parts of an organization involved in jointly delivering the product or service. Once there is understanding of what the customer wants, the organization moves on to identifying how the delivery is occurring
Create flow by eliminating waste	Eliminating waste results in the product or service seamlessly "flowing" to the customer without detours, interruption or waiting
Respond to customer "pull"	The process is created based upon the organization's understanding of customer demand, producing what is wanted when it is wanted
Pursue perfection	As radical reorganization occurs, gains becoming increasingly significant when all the steps link together. Perfection is the theoretical end-point, occurring when every asset and action adds value for the customer

design of senior day care processes.

Senior day care centres provides a full day programme for seniors who are suitable for centre-based care setting, and require supervision while their caregivers are at work. The services aim to maintain and/or improve the general, physical and social well-being of seniors through therapy. The centre also doubles as a place for seniors to socialise and take part in recreational activities. Key activities include: Physiotherapy, occupational therapy and speech therapy services, Group and individual exercises and games, social and recreational activities, centre-based nursing, case management, caregiver support programme and transport services. These objectives are in sharp contrast with care that are administered in institutionalised primary care environments, such as in a primary care hospital. There are, therefore, important contextual distinctions that can have implications on how long-term care facilities and work process, such as the senior day care centres should be designed to facilitate the care delivery processes.

Literature review

Lean

Lean is a quality management system aimed at maximising value for customers by reducing waste (e.g., overproduction, wait times, unnecessary inventory and motion) and reconfiguring organizational processes (5-8). Originally derived from the Toyota car company production line system, Lean paradigm builds on the significant history of work relating to structured process improvement. Widely known as an adaptation of the Toyota Production System (TPS), originated in Toyota factories after World War II,

Lean initiatives focus on "devising nimble tasks, processes and enterprises that maximize value and minimize waste in all of its forms" (9).

Lean is a set of operating philosophies, tools and management activities that help create maximum value for patients by reducing the sources of waste in a process (10,11). If resources are consumed without creating value, they become wastes. Ohno (1988) defined seven types of waste that create no value: Over-production, defects, inventory, transportation, waiting, motion and over-processing (12). Liker (2004) then proposed an eighth type of waste: inappropriate design (7).

Lean complements a philosophy of empowerment with a highly structured set of methods in order to deliver higher quality services at lower cost (13). Customers' needs and desires drive continuous improvement in the quality of services and products (13). The "true experts" in the process of health care (e.g., patients and families, healthcare providers and support staff) are engaged in a continuous learning cycle with the support and coaching of their leaders (14). Lean processes work as diagnostic tools to capture the sources of waste and identify areas of possible improvement. Lean philosophy is premised on five key principles as depicted in *Table 1*.

To support the stepwise approach to Lean improvement, the Define-Measure-Analyze-Improve-Control (DMAIC) problem solving approach as summarised in *Table 2* provided in De Mast *et al.*, 2016 is widely used to guide a scientific and structured approach to guide Lean implementation. The DMAIC approach outlines how a culture of effective and lasting continuous improvement can be realized (16), and thus have been commonly adopted in

Table 2 Define-Measure-Analyze-Improve-Control (DMAIC) phases (16)

Phases	Activities
Define	Select project and project leader and establish objectives and conditions
Measure	Make the problem quantifiable and measurable
Analyse	Analyze and diagnose the current situation
Improve	Develop and implement improvement actions
Control	Control the improved process performance and close the project

Lean implementations across sectors as well as in our study.

The set of lean tools that support the understanding ‘as-is’ processes and designing the improved ‘to-be’ processes include process mapping, stakeholders mapping as well as process time and value analysis (PTVA). These tools and techniques are commonly used to reduce waste and enhance productivity through reconfiguring organizational processes (15,17).

Lean in health care and community care services

As in many healthcare systems around the world, community care settings such as the senior day care centres in the community face similar challenges of improving care quality, reducing waiting times and increasing the efficiency of care services while also keeping costs from escalating out of control (5). Lean management is one of the models that have been introduced in health care in recent years as a potential solution. As a quality management initiative, Lean focuses on maximizing customer value and minimizing waste by improving the value chain (6,7). Even though Lean originated in the automotive industry (7), Lean applications are spreading in services, public sector, education and especially in health care (8-11).

Health care systems have increasingly recognized the potential value of the results-oriented Lean paradigm to make a valuable contribution to wicked and long-standing problems such as inefficiencies, lack of consumer-centeredness and spiralling costs that continue to plague the industry (9). Since the twenty-first century, Lean has become a commonly used strategy to meet challenges in the healthcare sector where it is now widely applied to increase efficiency and quality of care (11,13). De Souza and Pidd, 2011 argues that Lean in health care can provide structure, increase motivation and give employees ownership of their

own working practices, which in turn can lead to a healthier work environment (17). Others found that stress levels among managers decreased when the responsibilities shared among workers became routine and continuous (10).

Lean has been used in several healthcare services including acute care (18-20), especially surgery (21,22). The work processes at the surgery can be easily broken down and thus always been a fit for the lean application of process improvement methodology. The existing literature on lean implementation tend to focus on reporting the successful applications of Lean thinking that resulted in time savings, cost savings, increased patient and staff satisfaction, and reduction of errors and mistakes (23,24). However, the majority of previous research on Lean implementation in healthcare has not addressed the contextual factors and mechanisms that influence the success and sustainability of Lean efforts (25-27). We posit that understanding these factors will contribute in sustaining improvement efforts and are as important as understanding how to implement Lean in the first place (25).

Further, studies on the adaptation of Lean in community care settings seems to be scarce and limited in practice. Researchers noted that there seems to be limited knowledge and understanding on the operations and work processes in community care contexts and attention on process improvement are also relatively nascent (14,18,28-30). Therefore, this article aims to extend understanding in the adaptation of lean in the community care contexts by conducting an in-depth case-based research in two elder day care centres in Singapore. In this article, we adopted a qualitative case study approach to address the research question in this study: “*How can Lean be adapted to senior day care services for process redesign?*”

Method

Setting

This study used a qualitative case-based research approach based on Yin (31), 2003 to examine two senior day care centres in the community, when the centres were undergoing major reconstructions of the physical space and redesign of internal work processes. Lean thinking was used to guide the redesign of the physical space and work processes. The two senior day care centres (SDCs) that were examined are operated by a large community care organisation that has more than 18 years of experience in providing community care and senior care services

in Singapore. The company is publicly funded with 350 staff and 2,000 annual patients. It delivers a full range of integrated services and programmes for their clients through 22 eldercare centres across the country. The full range of integrated services and programmes include day maintenance care, day rehabilitation programmes such as physiotherapy and occupational therapy, dementia care, nursing care, respite care, wellness programmes and transportation. As the company enters active ageing hub and nursing home markets, the demand for senior day care centre services are expected to double. Therefore, the company had planned for capacity expansion by 56% in 2018.

The two senior day care centres that were studied were abbreviated as *SDC-1* and *SDC-2*. They are located in the public housing estates of Singapore and were due for expansion to cater for the growing demand in elder care services in the neighbourhoods. The two *SDCs* were similar in terms of manpower, facilities resources. Both facilities had approximately 20 staff and 120 seniors daily. The types of senior day care services provided by *SDC-1* and *SDC-2* were also similar. *SDC-1* was chosen as the first pilot site to lead efforts in an organisation-wide efforts in continuous improvement using Lean to improve internal work processes, while *SDC-2* was used for cross-comparison.

The author is a long term pro-bono volunteer at the organisation and was engaged as the external lean consultant on a pro-bono basis, providing domain expertise on lean implementations in health care and community care settings. Being an external pro-bono consultant that have been familiar with the general work environment and organisational norms of the *SDCs* helped the author to gain trust and support from the onset.

The study was conducted adhering to the highest ethical standards throughout the entire research process. Prior written consent was sought from all the participants involved in the study. The author ensured the right of the participants to anonymity in such a way that the identities of the individuals participating in the study cannot be recognized in the interview materials. Anonymity and confidentiality are protected throughout the entire study, and this protection extends to after the final report and publication as well (32,33).

Data collection

The core processes that are carried out at the two *SDCs* can be broadly divided into two groups. They are: (I) the day

re-habilitation activities such as physiotherapy, occupational therapy and speech therapy services and (II) the general care maintenance activities involving group and individual exercises and games, social and recreational activities, centre-based nursing, case management, caregiver support programme and transport services at the senior day care centres. The key process flows that were examined in the two senior day care centres, *SDC-1* and *SDC-2* were mapped. We collected multiple sources of data, including semi-structured interviews, focused group discussions, field notes from site observations, and the monthly reports and documents of centre-based operations parameters that are tracked regularly. These include monthly reports and documents relating to the operational efficiency, service lead time and manpower configuration at the 2 *SDCs*.

To identify the critical path and key activities in the *SDCs*, we carried out process time and value analyses at *SDC-1* and *SDC-2*. The semi-structured interviews were conducted with the key stakeholders involved in the care processes at the two *SDCs*. The interview participants include the day rehabilitation service staff, dementia day care service staff, maintenance day care service staff, nursing service staff (n=10), and the centre manager and operations director (n=4). Each interview lasted between 20 and 40 min. All the interviews were transcribed and coded using a thematic approach.

To corroborate the data from the interviews, we conducted site visits for general observations and two focused group discussions pre- and post-analyses were conducted. The focused group discussions were attended by the key stakeholders involved in redesigning *SDC-1*'s physical space and work processes. They included the CEO, the facility design architect, day care centre managers and the key staff involved in the care processes at *SDC-1* and *SDC-2*. In addition to individual interviews, the use of focused group discussions provided an avenue for the researcher to gain alternative perspectives of the core issues in a group format, which might differ from the individual or functional views, due to the difference in the organisational dynamics. *Table 3* depicts the multiple data sources and the key stakeholders who participated in the individual interviews and focused group discussions.

Data analysis process

Data for this research were analysed using qualitative content analysis methods—more specifically, inductive content analysis processes were applied. The data analysis process

Table 3 Data sources

Data sources	Participants/key stakeholders in the study
14 individual interviews	4 Day rehabilitation service staff, 4 Dementia day care service staff, 4 Maintenance day care service staff, 4 Nursing service staff, 2 Centre managers, 1 Operations director
2 Focus group discussions	1 CEO 1 Facility design architect, 2 centre managers and 4 care staff involved in the care processes at SDCs

SDC, senior day care centre.

firstly involved careful reading of the transcribed interviews, which gave a decent overview of the data, and then we independently analysed the data using a qualitative content analysis method to present it in a concise form without losing essential information. Denzin and Lincoln (2011) support selecting this method for data analysis of similar material (32). We applied a systematic approach to collecting information about the studied phenomenon from raw data to construct an interpretation of the phenomenon (34). Using content analysis also allowed us to understand the core themes of the dominant issues (35).

A cross-case analysis was conducted across the 2 SDCs to enable a deeper understanding of the main themes that emerged from the interviews and site observations. This is deemed as appropriate as it allow us to assess the applicability of the research results across similar cases (36). This is supported by Yin (31) who advocates a replication strategy in case research. Specifically, the examination of recurring themes is a technique that can identify variables that would not be wholly clear without cross-case analysis (32).

Our content analysis proceeded in phases, from analysing data units towards building a conceptual description (34). At the beginning of the analysis process, we developed and focused on descriptive concepts and themes that describe the care staff's work from the perspective of Lean management. We investigated the data inductively with the aim to capture the care staff's overall thoughts about lean in work flow redesign.

After this, the analysis proceeded through a data reduction phase and grouping of the overall thoughts by theme towards conceptualization. We interpreted the materials and advanced to the level of generating theoretical concepts (35-38). In this conceptualization phase, we returned to the transcribed interviews and examined them in the light of the developed main themes. In the final phase of the analysis, we made an overview of our progressive analyses and considered the suitability of their comprehensive description. The semi-structured interview

questions were crafted to increase our knowledge about the care workers' experiences on the lean adaptation in the work redesign. Our preliminary analyses of the field data and interviews revealed four key areas when adapting Lean in the 2 SDCs. They are:

- (I) Identifying values;
- (II) Adapting tools to the SDCs;
- (III) Standardized categories of care delivery activities;
- (IV) Identifying wastes and bottlenecks.

Our data analysis shed light on the key bottlenecks in the work processes at the SDCs, which have resulted in long lead times for the care delivery. At the same time, we gained insights into opportunities to improve the work flow at the SDCs. These are presented in the Results section.

Statistical analysis

Based on the monthly operation efficiency reports, the overall operational efficiency at SDC-1 and SDC-2 were computed. The overall efficiency calculated for SDC-1 and SDC-2 is an indicative metric used to track the amount of work performed by the average worker in one hour or termed as man-hour were estimated in the various stages of the care processes at SDC-1 and SDC-2. We found that there were large output differences in spite of similar staff and senior volumes at two SDCs. There were marked differences in efficiency relating to 4 categories of activities in the senior care processes. In specific, 27% SDC-1's man-hours were spent in *production* or direct care, compared to 72% of SDC-2's man-hours as shown in Table 4. Based on the number of seniors that were served at SDC-1 and SDC-2, the operational efficiency of SDC-2 was computed as 4 times more than SDC-1, in relative terms per man-hour.

The overall operational analysis of the 2 SDCs also allow us to identified the key bottlenecks in the care process. Process bottleneck is defined as a work stage that slows the process, interrupts the flow of work and delays the entire process because its capacity is not able to process

Table 4 Man-hours spent on categories of delivery activities for SDC-1 and SDC-2

Categories of process activities	SDC-1 SC	SDC-1 DR	SDC-1 total	SDC-2 SC	SDC-2 DR	SDC-2 total
Production	5.8	11.0	16.8	6.6	19.1	25.7
Reception	16.2	12.0	28.2	2.4	4.3	6.7
Setup	5.3	1.5	6.8	1.4	0.4	1.8
Cleaning & general admin	35.4	25.5	60.9	1.0	0.4	1.4
Total	62.7	50.0	112.7	11.4	24.2	35.6

SDC, senior day care centre; SC, the general care maintenance activities involving group and individual exercises and games, social and recreational activities, centre-based nursing, case management, caregiver support programme and transport services at the senior day care centres; DR, the day re-habitation activities including physiotherapy, occupational therapy and speech therapy services.

Table 5 Lean principles and adapted meaning in the SDCs based on Womack and Jones (15,24)

Lan Principles	Lean adaptations to SDC-1 and SDC-2
Identify clients and specify value	Clients are seniors. The specific senior-centric value is defined as the capacity for providing focused and directed care activities and seniors throughput
Identify and map the value stream	Identified 50 stakeholders, 20% of whom were not involved in SDC-1 and SDC-2 operations
Create flow by eliminating waste	Better flow in direct care by reducing difficulties in indirect care, including those from infrastructure
Respond to client pull	Matched processes to client demand, ensuring continuity in direct care where possible
Pursue perfection	Continuously pursued perfection in Lean services delivery and integrated Lean

SDC, senior day care centre.

work requests that arrive at a rate faster than its maximum throughput capacity (39).

In general, the bottlenecks occurred in the *reception* activities in both *SDC-1* and *SDC-2*, which took up 46% and 20% of *SDC-1* and *SDC-2*'s man-hours respectively. In addition, both *SDCs* faced common bottlenecks in the daily operational processes, which included general cleaning (4 man-hours/day), administrative processes/activities such as billing and payment processing for the day re-habitation services (4 man-hours/day) and therapy activities (7 man-hours/day).

Results

Adapting lean to improve work processes in the SDCs

We started by making sense of the common Lean principles and localising them to the specific contexts of the two *SDCs*. This is an important first step because it aided the organisation to establish a common understanding of the

Lean principles that are realistic to the context of the *SDCs*. *Table 5* shows the relevant lean principles that were adapted to the two *SDCs* in this study.

Cognizant of the peculiarities of *SDCs*, we present our findings according to the four thematic areas that were identified in the preliminary data analysis while adapting Lean in the 2 *SDCs*:

- (I) identifying values;
- (II) adapting tools to the *SDCs*;
- (III) standardized categories of care delivery activities;
- (IV) identifying wastes and bottlenecks.

Identifying values

A first step to align organisational thinking and Lean implementation is to identify the core values. Based on the interviews and site observations, we found that despite having strong management support on the Lean initiatives, there were initial doubts on feasibility and reluctance to possible changes that might result. However,

Table 6 Standardized categories of delivery activities for senior care centre only

Categories	Activities
Production (direct care)	Senior activity (group), senior assessment or activity (individual), serve food
Reception	Coordinate arrivals and attendance, enquiries and payments, general engagement, other assessments, senior administration, prepare and provide nametags, pick seniors from drop-off point, store wheelchair and aids, welcome seniors
Setup	Prepare food, seat seniors, transport seniors to sessions, setup centre or activities, team meet
Cleaning and general admin	Clear food, close centre or activities, general cleaning

core values that strongly resonates in this empirical sites were “respect” and “teamwork” that enabled the team to overcome the initial phase of resistance and establish progressive involvement of the relevant stakeholders over time. Quotes from the interviews are *italicized*. The project team concurred that “respect and teamwork” are clear conditions for the creation of an efficient flow. Respect was recognised as “*doing everything in order to understand each other and taking responsibility to do the best to create mutual trust.*” Teamwork was recognised as “*stimulating personal and professional development, sharing opportunities for development, and maximising individual and group achievement.*”

More importantly, these values are also key drivers that enabled the project team in soliciting responses and inputs on critical questions from the relevant stakeholders, which consist of the direct care staff, seniors, next-of-kin and caregivers of the seniors. For instance, the outcomes of the focused group meetings were the identification of non-core activities that were distracting the care staff from their main role of care delivery. It was recognised that activities relating to general area cleaning of the centre facilities such as routine cleaning of window panes, tiled walls and floors, distracted care staff from direct care duties and thus were recognised as non-value adding.

Adapting Lean tools to the SDCs

To facilitate the adaptation of Lean tools to the SDCs, we make use of the DMAIC framework (*Table 2*) to guide the project team in a step-wise manner to understand the ‘as-is’ state and visualise and establish the necessary conditions to achieve the ‘to-be’ state process. By following the DMAIC framework, the researchers and practitioners were also closely reminded of project fundamentals such as the need to stay on course in the project with the key problems and goal statements in sight.

We started our discussions based on the mapped processes that enabled a common view of existing work

flow, system and constraints that are faced by the various stakeholders. We categorised activities into direct and indirect care activities and identified areas where there is deficient activities and areas where there is an over production of activity. The team also attempted a value stream analysis, with the aim to identify both value-adding as well as non-value adding steps and activities that are currently carried out by the staff. The definition of value is taken from both the senior’s as well as the care provider’s perspective. For instance, cleaning and housekeeping of SDC by care staff certainly contribute to the overall cleanliness and hygiene of the SDC. However, time taken for cleaning and housekeeping might not be viewed as the best form of use of care staff’s time. We were able to identify 4 man-hours lost to food processing and brainstormed for a potential solution, which is to outsource meal arrangements to external vendors.

Standardized categories of care delivery activities

To enable a common basis of comparison between SDC facilities, we *standardized the categories of care delivery activities* to objectively evaluate and improve operations as listed in *Table 6*. We made sense of these activities through data coding to map the activities in the care path, engaging staff and performing site observations. We also distinguish the activities as direct or indirect care based on a senior-centric care focus.

The core processes that are carried out at the SDCs can be broadly divided into two groups: (I) the day rehabilitation activities such as physiotherapy, occupational therapy and speech therapy services and (II) the general care maintenance activities involving group and individual exercises and games, social and recreational activities, centre-based nursing, case management, caregiver support programme and transport services at the senior day care centres. These care services were categorised into 4 standard care processes: (I) *production*, (II) *reception*, (III)

Table 7 Waste identification using process time and value analysis (PTVA)

Types of Waste	Activity	Category	Proposed solution	Seniors volume	Lead time (min)	Throughput (min)
Overproduction	Transport	NA	NA	80	NA	NA
Transport, Movement, Waiting	Senior arrivals	Reception, Setup	Streamline	80	119	1.49
Waiting, Over-processing	Serve food	Reception, Setup, Cleaning and general admin	Streamline	80	118	1.48
Inventory, Waiting	Senior nametags	Reception	Streamline	80	124	1.55
Movement	Senior blood pressure	Reception	Capacity	40	69	1.72
Over processing	Senior administration	Reception	Streamline	80	121	1.51
Over processing	General cleaning	Cleaning and general admin	Capacity	NA	181	NA

setup, and (IV) cleaning and general admin that composed of up to 10 standardized activities as shown in *Table 6*.

Identifying wastes and bottlenecks using PTVA

To identify wastes in the processes, we make use of the PTVA to identify bottlenecks in the processes at the senior day care centres. The PTVA was mapped and inputs were sought with regards to the possible avenues to redesign the current infrastructure and the work processes. In the PTVA, we tracked both the lead time and throughput in order to measure the average efficiency and service rates at the two SDCs as depicted in *Table 7*.

Based on the PTVA conducted at the two empirical sites, we found that 60% of bottlenecks were due to bottlenecks arising from the existing space set up and layout of the facilities space, and only 40% due to processes. From the interviews, the care staff highlighted the *additional strains that they had experienced in having to respond to the need to do general cleaning of the windows, tiled walls and floors, which are distracting them from administrating direct care to the seniors*. They also revealed concerns over the lack of storage space that make it difficult for them to do proper housekeeping, given the current facility layout at the day care centres.

Further analyses of average lead time also revealed that activities that are not directly related to the core care activities took up to 30% of the time in the daily routine of an average care staff at the two senior day care centres. These activities include kitchen chores such as food preparation and general cleaning that distracted care staff

from core activities. To allow the care staff to focus on core care activities, the project team suggested options to engage external service providers through procurement of long-term service contracts for non-care activities.

Outsourcing meals arrangements to external vendors is an avenue to allow focused care and was estimated to provide savings of 4 man-hours. These options are expected to relieve the care staff from kitchen chores and cleaning works. Although there is outsourcing cost involved, based on the focused group meeting, the CEO, management and the key care staff all concurred that is a justifiable course of action in order to allow focused care at the SDCs. Besides adapting Lean principles in conceptualizing waste, the study also distinguished the dominant bottlenecks in the two empirical sites. For instance, not having enough equipment to manage caseloads and care services at the DRCs was a resource constraint that was resolved immediately.

Discussions and key lessons learned

A strategic framework based on Lean thinking was designed to motivate a coherent and coordinated system of process redesign at the two studied sites, SDC-1 and SDC-2. This involved the redesign of job scopes of the front line as well as the administrative staff at both SDC-1 and SDC-2. The redesign process was ongoing at the time of this article writing. It is a process that is envisioned to be a collaborative one with numerous inputs and face-to-face consultations with the CEO and process owners in the core service pathways.

One of the key findings that were highlighted to the management is that many of the recurrent activities that are taking up time from the care staff were kitchen chores such as food preparation and area cleaning which accounted for up to 8 man-hours per day. In the subsequent meet ups with the management and care staff, there were discussions on relieving the direct care staff of these distracting non-direct care activities through means such as outsourcing or hiring of temporary kitchen helpers and cleaners so that the care staff could focus in direct care. Process streamlining of the senior arrival workflow and payment administration were two immediate areas that renders attentions and review in the subsequent phase of the project.

Many of these are recurrent activities were kitchen chores such as food preparation and area cleaning, accounted for up to 30% of the time of the care worker. These kitchen chores and cleaning distracted care staff from providing direct care. The study identified options to relieve the care staff from distracting non-direct care activities by outsourcing of cleaning and housekeeping services or hiring of temporary kitchen helpers and cleaners. The management is also considering procuring a long term meal arrangement and cleaning vendor, which might relieve the front line staff at the *SDCs* from kitchen chores and cleaning works.

As we reflect on our work in standardising the categories of delivery activities at the two care centres, a major challenge lies in the need to reconcile the need of providing an individualist attention to the seniors at the care centres versus delivering a common set of mechanical steps in the care service delivery process. We held steadfastly in standardising the process of care delivery but not standardising the care provision to individual seniors. This highlighted the need for discretionary actions to be taken by the care staff and the care professional at sites.

The importance of stakeholder buy-in, management support and cooperation

During the Lean adaptations at the 2 *SDCs*, key insights that emerged from the field was the importance of stakeholder buy-in, where leadership from the management, cooperation and involvement of the functional units are pivotal for effecting the desired outcome. From the case observations and focused group discussion, key themes that emerged were also the presence of strong leadership and management support from the organisation, which facilitated the adaptation of *Lean* for possible improvements

to the process redesign (28,30,40-42).

The project team was focused on encouraging Lean thinking, and applying Lean's techniques to examine the "as-is" work processes and implement improvement actions to the work processes at the 2 *SDCs*. The organisational core values of "respect" and "teamwork" were also pivotal in enabling Lean, which aided to overcome the initial phase of resistance and establish progressive involvement of the relevant stakeholders over time.

The CEO and management regarded Lean as a long term strategy that can lead the organisation in the continuous pursuit to service excellence that is focused on the senior needs, while at the same time, achieve improvements in efficiency and effectiveness. Therefore, there were high levels of employee involvement from the onset of the project initiation in the two *SDCs* (*SDC-1* and *SDC-2*) that were pilot sites for leading the Lean efforts in the organisation. On the whole, Lean was perceived as a management strategy that could support an organisational-wide strive to continuous improvements in service excellence and efficiency.

Conclusions

From the onset, we seek to understand how Lean can be used to redesign the work processes in the eldercare settings by conducting case study research at two senior day care centres in Singapore. Through the case study, we showcased how Lean can be adapted in rationalising work process redesign in community care settings such as the senior day care centres. The findings from this study provide evidence on how Lean can be adapted to eldercare services delivery for enhancing direct care and minimizing non value-adding work in the end-to-end processes of the senior day care centres.

In summary, this study begins to address the research gap where the operations and work processes of senior day care services are relatively less examined. The findings and discussions serve as references to eldercare service providers, community care administrators and healthcare policy makers in adapting Lean for improving internal work processes in community care based settings. In addition, the paper also serves as a call to practitioners to minimise non-core activities that are distracting care workers from administering direct care services to the seniors.

In terms of limitations, the findings from the study are limited to two senior day care centres and cannot be generalized. To corroborate the findings from this study,

future research can be conducted in other elder care centre-based services. Future work can also assess the quality of the senior day care services that is supported by external service providers that are engaged to support in the non-core activities in the centres.

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Footnotes

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Ethical Statement: The author is accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted adhering to the highest ethical standards throughout the entire research process. Prior written consent was sought from all the participants involved in the study.

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References

1. Ministry of Health. Action Plan for Successful Ageing (Singapore, 2016). Kim Yong Gan. Speech by Minister of Health at the SG50 Scientific Conference on Ageing. (Speech, Singapore, March 19, 2015). Available online: <https://www.moh.gov.sg/news-highlights/details/speech-by-mr-gan-kim-yong-minister-for-health-at-the-sg50-scientific-conference-on-ageing-on-19-march-2015>
2. Haseltine WA. Affordable excellence: The Singapore healthcare story: how to create and manage sustainable healthcare systems. Brookings Institution Press, 2013.
3. Netten A, Beadle-Brown J, Trukeschitz B, et al. Measuring the outcomes of care homes. Canterbury: PSSRU Discussion Paper, 2010.
4. Heesterbeek M, Van der Zee EA, van Heuvelen MJG. Passive exercise to improve quality of life, activities of daily living, care burden and cognitive functioning in institutionalized older adults with dementia - a randomized controlled trial study protocol. *BMC Geriatr.* 2018;18:182.
5. Fine MD, Yeatman A. Care for the self: 'community aged care packages.' In: Individualization and the Delivery of Welfare Services. London: Palgrave Macmillan UK, 2009:165-86.
6. Womack JP, Jones DT. Lean Thinking: Banish Waste and Create Wealth in your Corporation. London: Simon and Schuster, 2003.
7. Liker JK. The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer. McGraw-Hill, 2004.
8. Emiliani B, Kensington C, Most US. Lean in higher education. Center for Lean Business Management. Available online: [https://www.abdn.ac.uk/staffnet/documents/0502-emiliani-lean-higher-education_\(2\).pdf](https://www.abdn.ac.uk/staffnet/documents/0502-emiliani-lean-higher-education_(2).pdf)
9. Mazzocato P, Savage C, Brommels M, et al. Lean thinking in healthcare: a realist review of the literature. *Qual Saf Health Care* 2010;19:376-82.
10. Poksinska B. The current state of Lean implementation in health care: literature review. *Qual Saf Health Care* 2010;19:319-29.
11. Deblois S, Lepanto L. Lean and Six Sigma in acute care: a systematic review of reviews. *Int J Health Care Qual Assur.* 2016;29:192-208.
12. Ohno T. The Toyota production system: beyond largescale production. Portland: Productivity Press, 1988.
13. van Leijen-Zeelenberg JE, Elissen AMJ, Grube K, et al. The impact of redesigning care processes on quality of care: a systematic review. *BMC Health Serv Res.* 2016;16:19.
14. Burgess N, Radnor Z. Evaluating Lean in healthcare. *Int J Health Care Qual Assur.* 2013;26:220-35.
15. Womack JP, Jones DT. Beyond Toyota: How to root out waste and pursue perfection. *Harvard Business Review.* 1996;74(5):140-72.
16. De Mast J, Does R, De Koning H. Lean Six Sigma for Service and Healthcare, Alphen aan de Rijn. The Netherlands: Beaumont Quality Publications, 2016.

17. De Souza LB, Pidd M. Exploring the barriers to lean health care implementation. *Public Money & Management*. 2011;31:59-66.
18. D'Andreamatteo A, Ianni L, Lega F, et al. Lean in healthcare: A comprehensive review. *Health Policy*. 2015;119:1197-209.
19. Lawal AK, Rotter T, Kinsman L, et al. Lean management in health care: definition, concepts, methodology and effects reported (systematic review protocol). *Syst Rev* 2014;3:103.
20. Goodridge D, Westhorp G, Rotter T, et al. Lean and leadership practices: development of an initial realist program theory. *BMC Health Serv Res*. 2015;15:362.
21. Mason SE, Nicolay CR, Darzi A. The use of Lean and Six Sigma methodologies in surgery: a systematic review. *Surgeon*. 2015;13:91-100.
22. Cima RR, Brown MJ, Hebl JR, Moore R, Rogers JC, Kollengode A, et al. Use of lean and six sigma methodology to improve operating room efficiency in a high-volume tertiary-care academic medical center. *J Am Coll Surg*. 2011;213:83-92; discussion 93-4.
23. White C. "Lean" thinking may cut NHS inefficiencies and improves patient care. *BMJ*. 2006;332:1471.
24. Womack J, Byrne A, Flume O, et al. *Going Lean in Health Care: Innovation Series 2005*. Cambridge, MA: Institute for Healthcare Improvement, 2005.
25. Al-Balushi S, Sohal AS, Singh PJ, et al. Readiness factors for lean implementation in healthcare settings-a literature review. *J Health Organ Manag* 2014;28:135-53.
26. van Rossum L, Aij KH, Simons FE, et al. Lean healthcare from a change management perspective. *J Health Organ Manag*. 2016;30:475-93.
27. Tay HL, Bhakoo V. Advancing Lean Healthcare: understanding efficiency paradox through a constraints management view. *Acad Manag Proc*. 2015;2015:13971.
28. Tay HL, Singh PJ, Bhakoo V, et al. Contextual factors: assessing their influence on flow or resource efficiency orientations in healthcare lean projects. *Oper Manag Res*. 2017;10:118-36.
29. Goodwin S. Lean implementation in home health care: Lessons in changing the culture and improving service at VON Canada with a three-year update. 2016. Available online: <http://www.lmmiller.com/wp-content/uploads/2016/07/Lean-Implementation-in-Home-Health-Care-updated.pdf>
30. Tay HL. Lean improvement practices: lessons from healthcare service delivery chains. *IFAC-PapersOnLine*. 2016;49:1158-63.
31. Yin RK. *Case study research design and methods*. Third edition. Applied social research methods series, 2003.
32. Denzin NK, Lincoln YS. *The Sage handbook of qualitative research*. 4th ed. Christchurch, New Zealand: Sage Publications, 2011.
33. Polit DF, Beck CT. *Nursing Research-Generating and Assessing Evidence for Nursing Practice*. 9th ed. Philadelphia: Lippincott Williams & Wilkins, 2011.
34. Elo S, Kyngäs H. The qualitative content analysis process. *J Adv Nurs*. 2008;62:107-15.
35. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res*. 2005;15:1277-88.
36. Firestone WA, Herriott RE. The formalization of qualitative research: An adaptation of "soft" science to the policy world. *Eval Rev* 1983;7:437-66.
37. Miles MB, Huberman AM. *Qualitative data analysis: An expanded sourcebook*. SAGE, 1994.
38. Eisenhardt KM. Building theories from case study research. *Acad Manage Rev*. 1989;14:532-50.
39. Allway M, Corbett S. Shifting to lean service: Stealing a page from manufacturers' playbooks. *J Organ Excel*. 2002;21:45-54.
40. Miller L. *Getting to Lean: Transformational Change Management*. Annapolis, MD: Miller Management Press, 2013.
41. Andersen H, Røvik KA. Lost in translation: a case-study of the travel of lean thinking in a hospital. *BMC Health Serv Res*. 2015;15:401.
42. Fine BA, Golden B, Hannam R, et al. *Leading Lean: a Canadian healthcare leader's guide*. *Healthc Q*. 2009;12:32-41.

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Semi-structure interview questions relating to the work processes and task-specific challenges at the 2 SDCs:

1. Consider your typical day at work:
 - (a) How many hours do you work in one day?
 - (b) How many patients did you see in a day?
 2. How many hours do you work per week?
 3. How many administrative tasks/ documents do you typically complete during working hours?
 4. How long (in minutes) on average do you take to complete each administrative task or all the administrative tasks per client?
 5. What are the administrative tasks/documents you are required to complete at work?
 6. From your view, on the scale from 1-5, 1-being the worse, 5 being the best, rate:
 - (a) Efficiency of general operations
 - (b) Quality of care
 - (c) Overall satisfaction
 7. What are some daily challenges you face in everyday work?
 8. How can we make your work easier for you?
 9. Any other comments?
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Semi-structured interview questions relating to Lean implementation experience:

1. How do you experience and understand Lean in your work care?
 2. The goal of Lean is to improve operations and activities. How have these matters manifested themselves in your workplace community?
 3. How do you experience and understand Lean in your work area?
 4. From the point of view, what are the challenges of Lean in your work area?
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