Implementing lean management/Six Sigma in hospitals: beyond empowerment or work intensification?

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This article analyses a process improvement project based on Lean Six Sigma (LSS) techniques in the emergency department (ED) of a large Australian hospital. We consider perspectives of the clinical and managerial staff involved in the project implementation, its implications for empowerment and work intensification. We find that the project appeared to improve patient flow from the ED to the wards and to have positive implications for some staff. However, these achievements tended to be the result of senior staff using the project to leverage resources and create desirable outcomes, rather than the result of the use of LSS, in particular. We found some evidence of work intensification, but this was attributable to wider systemic issues and budget constraints, rather than being a direct consequence of the use of LSS. We argue that translating LSS from a manufacturing context into the politicised and professionalised context of healthcare changes the usual questions about empowerment or work intensification to questions about the influences of powerful stakeholders.

Keywords: empowerment; hospitals; Lean Six Sigma; process improvement; work intensification

Introduction

Demographic changes, the introduction of new technologies and treatments along with increased social expectations have put pressure on governments and other funding sources to contain costs, seek more efficient and effective methods of managing hospitals, while at the same time to try improve patient care (Radnor & Boaden, 2008; Willis, Young, & Stanton, 2006). Since the early 1990s, there have been many health policy developments and initiatives including budget cuts, outsourcing, output-based funding models, productivity improvements, greater accountability through performance measures, human resource management (HRM) and leadership initiatives and quality improvement models (Leggat, Bartram, & Stanton, 2011; Willis et al., 2006).

Lean management (LM) was developed from the success of the Toyota Production System in improving the productivity and efficiency of automobile and other manufacturing sectors. More recently, LM has been implemented, in various forms, in the service sector, including healthcare (Radnor & Boaden, 2008; Womack & Jones, 2003). Six Sigma (SS) is a quality improvement methodology that focuses on reducing variation in product quality using tools such as process mapping and root cause analysis derived from the Japanese concept of *Kaizen* (continuous improvement) adopted by Toyota (Liker, 2004).

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The two methods are often combined and referred to as Lean Six Sigma (LSS; Shah, Chandraskeran, & Linderman, 2008).

One critical debate regarding the implementation of LSS, in both the manufacturing and service sectors, considers its effects on workers, rather than considering only its effectiveness as a technique to improve the efficiency of processes and product quality. This debate intersects with the issue of quality of working life, with arguments about the degree to which LSS may have implications in terms of worker empowerment and work intensification (Cole, 1989; Davis & Cherns, 1975; Parker & Slaughter, 1995). The research informing these debates has tended to focus on the effects of LSS on frontline factory workers and relatively low-skilled service sector workers (Graham, 1995; Rinehart, Huxley, & Robertson, 1997).

Many hospitals have tried to use forms of process re-engineering, such as LM and SS (Ben-Tovim et al., 2007; Kollberg, Dahlgaard, & Brehmer, 2007). Since the early 2000s, LSS and other process improvement methods have been promoted by the Department of Health (DoH, n.d.) of the Australian State of Victoria as a way to improve efficiency and effectiveness in its public hospitals, in a context of increasing demand for services and resource constraints. One particular concern is the widespread and controversial problem of 'Access Block' in emergency departments (EDs). Access Block occurs when ED's capacity is overwhelmed by demand for services and patients wait for long periods to be transferred to an in-patient bed. This may have unfortunate consequences such as ambulances having long waits outside hospitals before they can off-load patients or ambulances bypassing the closest hospital to take patients elsewhere.

In 2005, the DoH adopted the UK National Health Service's '8-Hour Rule', a key performance indicator (KPI) with a target of 80% of patients in EDs who require hospital admission, being admitted within 8 hours. Crowding in EDs is a significant issue internationally. In view of tight budgets, solutions such as expanding capacity may not be practical, so process improvement approaches are increasingly adopted as a solution (Holden, 2011; Migita, Del Beccaro, Cotter, & Woodward, 2011).

Following several consecutive years of poor performance in relation to the '8-Hour Rule', the tertiary hospital, which we studied, implemented an LSS-based improvement project aimed at increasing patient flows from the ED to other units in the hospital. The intention was to reduce the time taken to assess and stabilise patients in the ED and to increase the flow of patients out of the ED by reducing blockages in other units receiving patients from the ED. The 8-hour project used the define, measure, analyse, improve and control (DMAIC) method[1] based on LSS. Its primary aim was to improve the hospital's performance.

Given the claims about work intensification experienced by employees in lean manufacturing, we examine the outcomes after transferring LSS concepts to a hospital. The project addressed the flow of patients through the hospital, from their arrival, transit through various units to their discharge into the community. The project involved senior nurses and doctors with clinical and management roles, including the chief executive officer (CEO) and other senior managers, as well as the improvement team. This system- wide project is more complex than projects limited to unit-level improvements. In view of the complexity of hospitals and the involvement of clinical stakeholders from different areas, such projects present considerable challenges (cf. Radnor, Holweg, & Waring, 2012).

Others have discussed the range of tools and techniques that comprise LSS and their effectiveness in healthcare (Dellifraine, Langabeer, & Nembhard, 2010; Poksinska, 2010). Our contribution is to investigate the implementation of an LSS project and its impact on managers and clinicians from the perspective of the managers and clinicians themselves. We consider their views of LSS implementation, how they engaged with the project and the LSS tools, quality of work, participation and empowerment issues, as well as work intensification and stress.

This article is organised as follows. First, we explore the literature on LSS and its impact on employees in its originating manufacturing sector. Second, we explore the implementation of LSS in healthcare settings. Third, we outline the method used in the study. Fourth, we outline our findings and then present our discussion and conclusions.

Development of LM and SS in manufacturing

LM is based on the production system that Toyota developed to cut costs and improve product quality in car manufacturing. It aims to eliminate non-value adding steps in the production process (Shadur, Rodwell, & Bamber, 1995; Womack & Jones, 2003). While there are varying definitions of LM, Waring and Bishop (2010, p. 1333) identify five key principles to: (1) specify the value of the operational process, (2) identify value streams (i.e. 'those processes that will ultimately add value to the process'), (3) create flow by breaking down barriers and boundaries between occupations and groups, (4) pull of customers rather than suppliers' push and (5) continuous activity or continuous quality improvement.

Motorola developed SS with in an attempt to reduce the number of defective parts or errors to six standard deviations from the mean. SS uses an experimental cycle, DMAIC, focused on measurement and statistical control of product and process variability. SS supplements LM approaches by focusing on product quality inefficiencies in operations (Arnheiter & Maleyeff, 2005). Both LM and SS can be used in process improvement programmes. LM and SS can be seen as a set of tools and practices (Shah et al., 2008).

The implementation of LSS as a set of process improvement tools has been approached in a variety of ways. It can be argued that without the involvement of employees with their practical understanding of what is happening in work processes, it is not possible to achieve the full potential of LSS.

Shah et al.'s (2008) review of practices in manufacturing indicates that the context is important. For instance, they found a correlation between unionisation and a lack of implementation of cross-functional teams. These contextual variations have been examined across industries and national contexts; Gough and Fastenau (2004) demonstrate that LM implementation varies significantly between contexts. Are such differences magnified when changing the context from manufacturing to skilled clinical workers in healthcare?

Debates about effects on workers

With its focus on product quality, SS is usually underpinned by LM improvement methods (Shah et al., 2008). Much literature on lean manufacturing has focused on the impact of LM on workers' occupational health and safety, due to the intensification and speeding up of repetitious work. Critics have described LM as 'management by stress' because it 'sweats' workers through faster work processes, standardises jobs, increases social control through peer pressure and leads to a reduction in the labour force and workers having to do more with less (Graham, 1995; MacDuffie, 1995; Parker & Slaughter, 1995).

LM can also be seen as a strategy to marginalise unions by co-opting union representatives into a management mind-set and breaking down employee resistance to change (Stewart, Danford, Richardson, & Pulignano, 2010). Other criticisms of LM include: redesigned work and procedures, which can be a source of conflict between workers whose old work practices were different (Torella, Falzon, & Morais, 2012); lack of training and insufficient time for improvements (Bhasin, 2012); little or no influence over workplace decision-making (Stewart et al., 2010) and working harder rather than smarter (Gough & Fastenau, 2004). Stewart et al. (2010) also

found that while technological change led to claims about 'up skilling', this actually manifested as task enlargement, while workers' autonomy and control were reduced.

In their literature review, Jones, Latham, and Betta (2013) hold that Lean is an illusion and employee empowerment and control are effectively silenced while management control and surveillance increased. However, as Vidal (2007a, 2007b) argues, the whole concept of employee empowerment is complex and limited, due to a range of factors including not only managerial prerogatives but also the individual disposition of workers, in particular their 'concerns, values, attitudes and orientations' (Vidal, 2007b, p. 229).

Kashefi (2009) explores such complexity, further arguing that paradigms such as LM are labour– management strategies to enhance workers' attachment to employing organisations and thereby increase productivity. He describes these as internalisation strategies that have 'intensified expectations and responsibilities, increased workloads, and escalated conflicting demands in the workplace which in turn has created more job stress rather than enhancing the opportunity for higher job satisfaction' (2009, p. 813). However, Kashefi (2009, p. 823) also recognises the complexity of the internalisation strategy and in his study of workers from manufacturing, construction, transport, services and sales, he found that 'the adoption of an internalisation strategy .. . has produced complicated sociopsychological results, simultaneously improving employees' job satisfaction and intensifying their job stress'. This job stress was due to 'increasing work and family conflict, workload and work pace and conflicting demands in the workplace'.

Anderson-Connolly, Grunberg, Greenberg, and Moore (2002) adopted a more nuanced approach. They argue that aspects of process improvement and workplace change induced by LM may be beneficial for some workers, but detrimental for others. For example, they identify five aspects that could impact on employee well-being: increased autonomy, intensification of work, increased skills, working in teams and increased use of new technology. In their study of employees and managers, they found that work intensity was harmful both for managers and for non-managers. However, there were differences regarding the impact between managers and non-managers relating to autonomy, up- skilling and technology, suggesting that 'there may be a point at which individual responsibility and accountability in a situation of complex interdependencies become stress producing rather than empowering' (Anderson-Connolly et al., 2002, p. 408). They argue that LM debates often polarise into discussions of empowerment versus exploitation and suggest that the multifaceted nature of re-engineering means that it can be both, and could also be linked to hierarchical status (Anderson-Connolly et al., 2002).

In relation to benefits, other authors have argued that LM's focus on empowerment and training is the key to improved productivity (Birdi et al., 2008). LM can provide a high level of training and employment security (Bonavia & Marin-Garcia, 2011). Furthermore, LM has positive effects on work organisation of employees in terms of autonomy, enhanced skills and empowerment through their enhanced participation in the continuous improvement of work processes (Torella et al., 2012). Moreover, De Menezes, Wood, and Gelade (2010) argue that key HRM practices that support LM are a learning culture (extensive training), empowerment and teamwork.

Implementing LM in healthcare

Pressures on governments and other funding sources to make better use of scarce resources to enhance productivity, efficiency and effectiveness and improve hospital performance (Leggat et al., 2011; Willis et al., 2006) have led to increasing moves towards managerialism into healthcare, the re-negotiation of jurisdictional boundaries and changed forms of governance. Hence, Lean healthcare (a term commonly applied by UK researchers) seems appealing to many healthcare managers (Waring & Bishop, 2010). Since the early 2000s, LM projects in hospitals have become increasingly widespread including in the USA, Canada, the UK, Australia and elsewhere (Poksinka, 2010; Radnor et al., 2012). As Waring and Bishop (2010, p. 1334) argue that 'Lean illustrates the desire of policy makers to reorder clinical work through the introduction of managerial philosophies and techniques'.

Challenges for Lean healthcare

LM initiatives in healthcare have usually involved localised changes to processes through small projects that have focused on small-scale activities offering a technical fix for current problems with a narrow range of technical tools (Radnor et al., 2012). Furthermore, there is not yet strong evidence that process redesign strategies are effective in transforming healthcare (Dellifraine et al., 2010; Guo & Hariharan, 2012). Although there is some evidence of positive results in the reduction of waiting times, errors and costs and increase in employee motivation and patient satisfaction, there are major challenges in making more extensive whole-system improvements (Radnor et al., 2012; Waring & Bishop, 2010). These challenges include organisational readiness, embedding a culture of continuous quality improvement, effective leadership, the availability of resources and clear communication strategies (Radnor & Boaden, 2008).

One of the major barriers to implementation is the organisational politics of healthcare. Most healthcare managers operate in hierarchical organisations where a range of powerful stakeholders influence the nature of work, the way that work is undertaken and the resources available. This context creates particular challenges for the introduction of innovations that were originally developed in a corporate manufacturing context (Leggat, Bartram, & Stanton, 2008) rather than in a public-sector health context.

Healthcare professional associations and unions delineate the boundaries between occupations, and circumscribe changes in practices and work design to a much greater extent than applies to workers on an assembly line. Doctors are generally responsible for decisions to admit patients, initiate diagnostic tests and treatment procedures, and patient discharge. They operate within their obligations to their own professional associations, as well as hospital capacity constraints. In Australia, for instance, medical consultants in public hospitals might have dual income sources, i.e. also from private practice. Nurses also have their own professional registration boards, and a relatively powerful union (Cregan, Bartram, & Stanton, 2009). Clinical staff are highly trained professionals who perform complex work treating and caring for patients, in specialised units in hospitals which are, themselves, complex organisations. The concerns of clinical staff tend to be focused on the unit they work in, rather than with the wider organisation or mission. Many clinical staff have only a limited understanding of what happens in other areas of the hospital. Moreover, these institutional boundaries are overlain by traditional occupational work roles and professional demarcations between clinical staff. These institutional and occupational demarcations complicate and constrain efforts to improve patient flows between the different functional units of the hospital (Leggat et al., 2008).

The translation of key concepts such as ‘who is the customer?’ and ‘what constitutes value?’ may become contested in hospitals. Unlike manufacturing environments, where profit is the KPI, healthcare professionals bring a complex set of values in relation to patient care, professional ethics, as well as professional and organisational KPIs and personal motivations. In hospitals, there are often significant tensions between skilled professionals such as doctors, who are mindful of patient care and safety, and senior hospital management who tend to focus on hospital budgets and efficiency. Hence, the various occupational groups may have different interpretations of ‘quality improvement’ (Reay & Hinings, 2009), including what is ‘best for the patient’. While key organisational stakeholders may share such notions as ‘the patient’s journey’, they remain contested in practice. These issues may contribute to the frequent reports of clinical resistance to managerial-led change. Waring and Bishop (2010, p. 1339) focus on how process redesign is translated and interpreted and resisted by different professional groups and the ways that ‘clinicians can corrupt, game and capture attempts at reform’ to maintain or extend their influence or counter the interests of others. Together, such influences suggest that the effects of LM on clinical workers in public hospitals can be quite different from those on workers on the factory floor.

In this paper we focus on the ED in a large tertiary hospital in Australia and call it the Big Hospital (BH) to preserve its anonymity. We explore the implementation of LSS and how clinical staff engaged with the project. Reviewing the implementation of LM in EDs, Holden (2011) found that although Lean appears to 'offer significant improvement opportunities in the ED', improving employee outcomes is not usually a goal of those who aim to implement LM. Hence, our research question is: what are the advantages and disadvantages of implementing LSS in a hospital context from the perspectives of the key medical and nursing staff involved?

Methods

This study examines a large-scale process improvement project implemented in the ED and other units of the hospital during 2009–2010. In line with Pettigrew (2005), we used a multi-level, interdisciplinary approach to our analysis, drawing on historical and current data and considering the organisation within a wider social and political framework.

Our data collection methods included reviewing the hospital's data on quality of patient care and patient flow in the ED and the analysis of key documentation at each stage of the DMAIC cycle used by the core group managing the project. This documentation included a range of research and policy literature. The core group comprised the CEO, senior executives and senior doctors, four Nurse Unit Managers (NUMs) and quality improvement staff. While the involvement of staff below these levels was minimal, 55 clinical staff were consulted in the Define (the problem) stage of the project by core group members.

We used this information, as well as issues that we had already identified from the literature and our experience in this field, to develop our interview schedule. Between April 2012 and January 2013, we conducted in-depth semi-structured interviews with 24 key informants who had experience or knowledge of the project, including some who had subsequently left the hospital. These interviewees included senior members of the leadership team as well as clinical managers (Medical Directors and NUMs) and their staff. We also interviewed the Lead of Quality Improvement at the DoH.

The interviews enabled us to investigate the introduction and implementation of the LSS project from the perspectives of clinicians and managers. Our interviews included a focus on: their role in the project, their perceptions of the process and any outcomes; the role of the senior executive in implementation; resources lost or gained; sustainability; and views on KPIs, especially the 8-hour rule. The interviews were a rich source of information and allowed for suitable crosschecks of data.

Triangulation of several data sources allows for multiple perceptions about a particular case, and provides validity as researchers search for convergences among multiple and different sources of information (Healy & Perry, 2000).

All interviews were audio recorded, with the permission of interviewees. We analysed the transcripts using a thematic content analysis that developed codes both from our theoretical interests and on emerging themes from the participants' descriptions of their own experiences.

Findings

LM and SS in the ED: engaging clinicians

The newly appointed CEO was a passionate advocate for LSS. She led LSS approaches to increasing efficiency. An improvement team of senior clinical and managerial staff reported directly to her. The team was trained and mentored in 'LSS methodology' by external facilitators. After piloting the process in the hospital courier system, the team initiated an LSS project aimed to reduce access block in the ED by addressing process flows across all functional units within the hospital.

A critical issue associated with hospital capacity management is the rate of bed occupancy (Sammut, 2009). If hospitals operate at 100% bed occupancy rates on in-patient wards, any increase in patient numbers, without more beds being made available, will contribute to 'bed block'. The consequence of hospital 'bed block' for the

ED is 'access block', since if the hospital is full, there are no beds for patients requiring transfer from the ED, so patients remain stuck in the ED, awaiting a vacant bed (Cameron, Joseph, & McCarthy, 2009). Hence, patient flow across the hospital is a function, not only of the efficiency of processes within ED or other single units of the hospital, but also the rate of patient flow between units (from ED to wards) and discharge rates (patients leaving the hospital thereby freeing up beds). In BH, bed occupancy rates approximated 100% for nursing staff, evidence suggests that such a high level of bed occupancy increases stress levels (Virtanen et al., 2008).

The State DoH had been scrutinising BH for poor performance and at the start of the project, the ED was generally blamed as the source of delays and hospital-wide problems. The ED NUM highlighted this:

> *We'd go along every Friday morning to a meeting, which was basically about how we might have even been the worst in the State. Certainly we were the worst of our peer group .. . . The CEO put up de-identified information saying how terrible we were. And that was basically the tone of it.*

The project took 18 months, it was top-down and tightly controlled using the DMAIC cycle and it had to pass 'tollgates' before the project could be moved to the next stage. The specific changes in the ED were accompanied by a significant increase in resources, as well as improvements to patient flow in other areas of the hospital. The completion of a major AUD$53 million redesign of ED, completed in late 2009, occurred concurrently with the 8-hour project.

Initially, there was some resistance to getting involved in the LSS project by staff, and some NUMs were seconded to the project against their will; often staff were not readily available to backfill their positions. A NUM in the ED said:

> *'We were told to participate .. . and I didn't want to do it .. . '.*

She also argued that few nurses received any training in the LSS processes until well after the project roll-out:

> *I'm going to meetings .. . I had no idea what I was doing because .. . they hadn't really figured out what they were doing .. . but they were going on .. . about LSS methodology .. . and if you follow it you know .. . it's all going to be fabulous.*

Staff also reported anxiety about speaking up at meetings, due, for example to issues of status. An NUM in Cardiology commented:

> *'I didn't really say too much in any of these meetings at the start, because like they have the CEO .. . and I've never met her before never mind sit at the same table as her!'*

Despite these early difficulties regarding engagement with management and improvement team processes, clinicians in some wards, who had already been working to improve the flow between their ward and the ED, recognised that they could use the project to enhance and develop this work. The Cardiology NUM saw an opportunity:

> *'So I said – it's up to you guys what way you want it done. Whether you want something forced down your throat or whether this is an opportunity to work something out that'll suit us.'*

Another example within the ED was a shift to surgical team diagnosis and treatment. This was initiated and led by the Director of Surgery, initially independent of the project. He had proposed a new model and, using his own funds and unpaid overtime, had recruited a couple of surgeons to assist in trialling the use of teams of junior doctors, registrars and consultants to work simultaneously on diagnosis and treatment, rather than the former system of sequential consultation. It was only after this trial proved successful in increasing the rate of patient flow that the project

improvement team supported it. The Director of Surgery commented that:

> *And the 8-Hour thing gave us the political leverage that we felt we could change it, because we felt we could go to the hospital and say, we reckon we can help you with 8 hours if you give us a look in with this thing.*

It was often this attitude by professionals of using the LSS project to further their earlier goals that enabled change to take place. Interestingly, a senior medical staff commented that previous attempts to implement such a model in the ED for medical patients had been rejected as too costly. The formal implementation of surgical teams in the ED as a result of the project was supported by specific funding from the State Government.

Developing teams

In the ED, team identification was embedded in the structure since staff operated as a discreet unit. However, models of teamwork had changed over time for a range of resource-driven reasons. By participating in the project, ED nurses were able to reinstate their previous practice of team nursing, which had been abandoned earlier in the face of nursing shortages. The Director of Nursing observed that:

> *And then we did something really revolutionary [*sarcastic voice *]. We introduced –reintroduced – team nursing, which had fallen over, which had basically changed because we had staffing issues, we had casual staff. All of that changed. So, we decided we'd go back to team nursing. And then the medical staff thought 'What a good idea .. . .' We might align those medical teams to be the same as the nursing teams .. . . And now we can show that we get patients seen quickly.*

This teamwork model was already used in the resuscitation area and was more organised and focused on the treatment of patients. However, the success of a team-based model relies on having the right balance of senior and junior staff in a team. Teams without appropriate experienced and skilled senior staff can make it difficult for the team to meet targets and can increase work pressures on the experienced medical staff in the team. Such imbalances in team structure can result directly from cost pressures.

Work intensification and work stress

The largest contributors to work intensification and stress were bed occupancy levels, access block and increase in in-patient numbers. Patient flow into wards is not only from the ED admissions, but also through external transfers from other hospitals, as well as internal transfers between wards and specialist units. Balancing such conflicting flows is the responsibility of the NUM in conjunction with bed managers. With the project focus on the ED access block, patient flow from the ED was prioritised, with flow-on effects for other patients and ward staff. Of the three wards studied, in two of the wards the project failed to deal satisfactorily with bed block. One NUM commented:

> *We are down eight beds today. Today I need to get .. . a number of people in from other hospitals, from ED, from ICU [Intensive Care Unit] plus the electives [* from operating theatres*] .. . . But we are at such a bed block situation; I have got nobody moving anywhere .. . . And there's people sitting in ED.*

The other ward had a lot of trauma patients admitted and other patients processed through the operating theatres. The NUM there also reflected on bed block, saying that she was not in control of the situation due to the impact that other units had on her ward:

> *.. . with [*this ward*], it's really difficult. Because we're .. . reliant on other people being able to service us .. . because for us to get patients in, we need to get patients out. And we don't have the rehab. facilities or aged-care-sort-of beds to take our patients, then they're stuck here.*

The third mixed medical/surgical ward was more self-contained, so there was greater capacity to discharge patients. This reflected the shorter average times to treat the patients, so most patients could be discharged sooner. The problem of competing pressures from the different sources of patients and destinations of patients once they leave the ward points to the problems of moving from a functional design to a process design based on patient flows. While the project provided a greater understanding amongst those interviewed of the organisation-wide consequences of improvements in patient flow, it did not cope well with the problem of the interface between different functional units inside and outside the hospital. The process redesign resulting from the project did not directly increase the levels of work pressures associated with high bed occupancy rates and bed block. These were already high. However, it did increase the rate of patient turnover by increasing the rate of planned patient discharges and the actual discharges, and the flow rate of patients and the intensification of work associated with this. If flow rates increase, a similar amount of work has to be done in a shorter amount of time.

As a result of the project, the hospital introduced its own KPI, requiring each ward to discharge at least two patients by 10 am. Patient discharges are complicated, requiring liaison with a range of allied health staff and agencies. Hence, increasing the rate of discharges per shift potentially increases the amount of work for nurses. NUMs commented on patient flows and discharges. An NUM in Orthopaedics commented on increased work pressures: *'Absolutely [*increase pressure over last three years*] .. . it is a business. It is about getting them in, getting them out. That is what it is about.'*

She also noted the pressures of trying to cope with patient flow, particularly during times of seasonal high level of patient demand (e.g. in the winter 'flu' season). An Assistant NUM also remarked on the pressures of discharges:

> *There is a lot of pressure … more so now. Like we're aware of the patient, that they [*hospital management*] want to achieve these targets .. . the more admissions, the more work, the busier we are. … . Patients are not spending as much time in intensive care and there is that sort of expectation that ward nurses will be able to sort of manage with patients that are more complex and more unwell.*

An NUM commented that the change in the pace of work over the last two years had been 'astronomical'. She also noted that her patients were more challenging because of their high acuity: '*Our patients are acutely sort of unwell … coming from, you know road accidents and they are coming from ICU .. . and then you've got frail elderly as well.'*

We infer from the comments of senior nurses from the three wards that there were already problems with pressures from discharges and patient flow before implementing the project. While the introduction of the KPIs may have exacerbated this, it was ameliorated for day-shift nurses by transferring most of the work associated with discharges to the night shift. Such work intensification, however, cannot be attributed to LSS, since these discharge KPIs are driven by the State Government and hospital management.

Positive impacts

The project also led to positive benefits, including those reflecting an increase in resources. Major changes included more bed cubicles and short-stay unit beds, further development of the Medical Assessment and Planning Unit, as well as the introduction of IT software (Symphony) for monitoring bed availability. At the ward level, patient flow was enhanced by opening more rehabilitation beds, which improved the discharge process.

The combination of positive benefits during the project reflected improvements in the immediate period following the project's implementation. A senior ED staff indicated that the changes improved efficiency without leading to further work intensification. However, it is not easy to ascertain the relative contribution of

different aspects to this result. The Director of the ED recollected that.

> *'There was an organisation-wide focus, which actually set the groundwork for doing some of the work we had to do on patient processes, because it meant .. . none of the departments work in isolation.'*

However, while significant improvements were achieved, he expressed concern relating to their sustainability due to the organisational politics at BH:

> *There's been three or four iterations of leadership change since I was there, and all the processes .. . that we put in place have basically been dropped. And that is the nature of public hospitals, that . . . you get something in place, you get it all organised and then the leadership changes, it all drops by the wayside.*

Sustainable change in a politically volatile organisational context is difficult to achieve. The ED Director argued that changes are sustained only if 'those things are almost ingrained into the system'.

There were other changes, which potentially had positive effects for some employees as well as improved patient outcomes. However, many of these improvements were not the direct result of the LSS initiative. For example, there were improvements in the relationships between the ED and in-patient wards. In particular, in the mixed surgical and medical ward, the Medical Director and the NUM had been concerned about relationships between their ward and the ED in terms of moving patients to the ward expeditiously. A complex process had been in place, which inevitably led to long delays with both the Medical Directors and the NUMs, each blaming delays on the other. The ward NUM initiated the collection and analysis of data by the staff, which helped identify causes and potential solutions. Interestingly, the ward patient flow manager (an Assistant NUM) said that he had no training in LSS and that the ward did not use data according to the project model: *'We just sort of started collecting our own data.'*

A related change initiated by this ward NUM was discharge planning. The pressure to discharge more patients to free up beds put great pressure on nurses on the day shift. The NUM suggested that if patients were identified the previous day, then the afternoon shift could organise drugs for them from the pharmacy, which was closed overnight. The night shift could also assist with preparation and planning so that it was easier for the day shift to get patients discharged. Management subsequently developed such discharge planning into a KPI for all wards. The Assistant NUM added that this was a new concept. However, he noted,

> *'It became .. . part of the work process, and it got streamlined and people knew their responsibilities .. . I don't think it really increased work pressures.'*

Another impact of LSS was the increased use of white boards as visual aids, which identified the patient's status so that it was simple to see whether pre-discharge tests had been done rather than checking with staff. This saved time and effort and was mostly welcomed by staff. Process change also followed from the resources to improve the use of the Transit Lounge, which allowed discharged patients to wait comfortably to be met by their family/friends and discharged. While a Transit Lounge had been 'available' earlier, it was not used because it was inconveniently located and unstaffed, therefore, not seen as suitable for patients. During the redesign of the ED, a new, properly equipped, convenient transit lounge had been established, staffed by appropriately trained nurses and where pharmacy could deliver medications to patients directly, rather than having them remain in the ward. A NUM seconded to the project improvement team identified the importance of promoting this service to ward staff.

Discussion

We examined a hospital-wide LSS project to improve patient flows from the ED to inpatient wards and subsequent discharge. As in manufacturing, LM has been introduced into healthcare as a way of improving productivity, through engaging employees in reducing waste and improving systems. The means used at the BH was a top-down, tightly controlled and rigidly enforced DMAIC process. Nevertheless, clinical staff had their own ideas about improving patient care and there had also

been earlier attempts to improve patient flow and access to care. Several interesting issues emerge from this study and these are discussed below.

First, although there were positive outcomes, in line with most hospitals in the State, BH never achieved its target of having 80% of patients admitted within 8 hours. Many of the challenges facing hospitals are system-wide, not just those of individual units. As already discussed, there are many variables that determine workloads, which a hospital has little control over. Also Radnor and Boaden (2008) argue, most successful lean projects in healthcare have been small-scale projects. In contrast, this study is of a large- scale system-wide attempt to increase patient flow across the hospital. We found that despite many positive changes in the relationships between hospital units and with patient flow from the ED and through the hospital, bed block remained a hospital-wide problem. The underlying causes were often structural and beyond the control of individual clinicians or teams.

Second, top management drove the project for more than 18 months, which many busy clinicians felt was time consuming and too long. While there were benefits in having committed leadership from the top, it did lead some senior clinical staff initially involved in the project to disengage as they felt it had little relevance to their work and so did not take 'ownership' of the project. On the other hand, some clinicians used the process to meet their own needs and implement modes of work which had not previously been funded or supported. Hence, there was an increase in the engagement of some senior clinicians as the project provided an opportunity for them to achieve particular changes, which they promoted as in the best interests of their patients. Waring and Bishop (2010) also found that clinicians could manipulate reform processes to maintain and extend their own influence. Alternatively, it could be argued that the change process acted as a catalyst for good ideas to come to the notice of senior executives and elicit their support. Furthermore, these improvements were often associated with extra resources; these reflected both the high-profile nature of the project and the opening of the new ED.

Third, in manufacturing, teamwork in lean production involves multi-tasking, i.e. employees doing a range of relatively low-skilled, compartmentalised and standardised work. Whereas in healthcare, clinical staff are already highly skilled with a high degree of autonomy. Hence, the re-introduction of teams into the ED during the LSS project should be understood in relation to shortages of staffing resources and skill mix. Furthermore, doctors and nurses have allegiance to professional colleges, and multi-skilling is restricted by professional demarcation traditions. For example, there were fruitless efforts to introduce the re-definition of job roles, such as permitting nurses to administer analgesics rather than needing a doctors' approval.

Fourth, while the occupational health and safety problems associated with increasing speed and the repetitious work identified in lean manufacturing are less relevant to clinicians in the ED, we still found evidence of work intensification. Clearly, resource capacities to support ED teams, issues of increasing patient demand in conjunction with capacity restrictions contributed to work intensity in the ED. This is common in public healthcare as hospitals struggle to do more with less and is related to macro issues, rather than the application of LM. Furthermore, increasing work intensity reflects hospitals currently approximating 100% levels of bed occupancy, with capacity restrictions and increasing patient demand (exacerbated by changing population demographics). Hospitals are also confronting sicker and more complex patients having shorter stays, which intensifies the work associated with patient churn and discharges (Duffield et al., 2011), and shifts in clinical staff labour markets. However, LM in healthcare has the potential to increase the flow of patients through the system, hence increasing work intensity.

Conclusions

We reviewed the literature, which highlights that the impact of LSS on employees is complex and influenced by a range of contextual and managerial strategies. This leads to variability in outcomes. The implementation of LSS can be beneficial for some workers, detrimental for others, or a combination of both.

The professional status and relative autonomy of clinicians indicate a different experience and view of LSS compared with that of manufacturing workers. Hence, questions of empowerment or exploitation are less relevant in healthcare than in manufacturing. However, introducing LSS in healthcare is a challenging process in

a more complex context than manufacturing. We conclude that the implications of LSS for staff are not as simple as choosing between either empowerment or exploitation.

We found that the engagement of clinicians with the project and having extra resources provided improved patient flow from the ED to hospital wards, leading to some changes having a positive impact on the work of staff. However, these outcomes were mainly the result of clinical staff using the LSS project to leverage resources and to make the improvements, which they had wanted, rather than being the result of using the LSS methodology. Whilst we found evidence of work intensification, this was not primarily attributable to the LSS project, but rather to wider system issues and budget constraints. Nevertheless, to the extent that LM achieves increases in patient flow rates, there is potential for increased work intensity.

This is a study of one case, so it has limitations and we should be cautious about generalisations from this case. Also the majority of the interviewees in our study were managers and senior clinicians, rather than front-line employees. We would encourage further research on the implementation of organisational change and improvement using LSS, including a broader range of staff. Furthermore, it would be appropriate to investigate contexts in other elements of healthcare and other sectors, across different countries.

This study highlights the attempts to implement organisational change and improvement using LSS methodologies. In this case, the implementation of change and improvement depends to a great extent on the context and organizational politics. The context and politics in healthcare are influenced by the professional demarcation lines and silos of clinicians, particularly the doctors and nurses, and how they re-interpret and make use of LSS in relation to their professional interests and values. Following Pettigrew (2005), we advocate that future healthcare research on LM and organisational change adopts an interdisciplinary approach that combines multiple levels of analysis, including social, political and sector-based with historical and current data to provide an accurate analysis of organisational change and strategy.

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Note

1. DMAIC is an experimental cycle, similar to the Deming cycle PDCA (plan, do, check, act) focused on precise measurement and statistical control of product and process variability.

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