Can lean contribute to work intensification in healthcare?

Introduction

The use of Lean in publically funded health services has become popular due to its promise of reducing costs while promoting efficiency (Radnor *et al.*, 2012). However, the majority of process improvement research tends to come from a technical perspective, rather than a focus on the people related perspectives or the social processes that are integral to Lean's success (Delbridge, 2007, Bamber *et al.*, 2014). Lean has been described as a socio technical system that requires the simultaneous management of technical and work organisation aspects of production to capture Lean's benefits (Shah and Ward, 2007). Lean uses a range of HRM techniques, also known as High-Performance Work Systems (HPWS), which include practices such as team-work and multi-skilling to engage and involve employees in continuous improvement activities (Delbridge, 2007). For healthcare, part of Lean's attractiveness is this focus on involving employees (Ballé and Regnier, 2007). However, the Lean healthcare literature has tended to focus on the use of Lean's tools or its technical applications (Radnor, 2011), with few articles describing the workforce's engagement and its effects (Joosten *et al.*, 2009, Holden, 2011). The social and workplace aspect of Lean healthcare is an area of increasing interest in the health services and public management literature (Sloan *et al.*, 2014) in part due to the differences between healthcare and Lean's manufacturing origins (Young and McClean, 2008) and as part of an effort to better understand how and why Lean works - or doesn't - in different contexts (Walshe, 2007).

Lean in healthcare has been shown to improve patient flow, wait-times and the quality of healthcare's processes (Kaplan *et al.*, 2014) and it shares many of Lean manufacturing's prerequisites for successful implementation (Sloan *et al.*, 2014). However, Lean has by its very nature the propensity to intensify work (Delbridge *et al.*, 1992). There is evidence of Lean having a negative impact on work environments and employee wellbeing (Smith, 2000, Stewart *et al.*, 2009, Lucey *et al.*, 2005), particularly for low complexity work, although this evidence is mostly derived

from manufacturing (Hasle *et al.*, 2012). While many of the published accounts of Lean's application in healthcare generate data which encourage an acceptance of Lean as a benign methodology, there is little conclusive evidence either way (Andersen *et al.*, 2014).

Work intensification is problematic in the context of Lean healthcare as it may contribute to undermining the *raison d'etre* of Lean while reducing the quality of work and worker health and safety (O'Donnell, 1995, Willis and Weekes, 2005). As this phenomena has not been widely studied this article aims to fill this particular gap in the literature. Its specific intent is to introduce and discuss the possibility of a relationship between Lean and intensified work in the context of healthcare.

Work intensification (WI) is defined as the "working conditions in which workers are subject to constant pressures to increase output and productivity levels" (Knights and Willmott, 2007, p. 546). It has been found to have two dimensions: working longer (extensive effort); and working harder (intensive effort) (Green, 2001) or what O'Donnell, *et al.*, (1998) refer to as doing the same or more with less staff. The processes that introduce WI to workplaces have been identified as being associated with an increased focus on the needs of the customer, the redesign of jobs and the controls placed on work and its quality (Beynon *et al.*, 2002) along with increasing work volumes independent of any change to the work (White and Bray, 2003). These mechanisms align with Lean through its principles and practices of customer centric value determination and multi-skilled workforces working in synchronised processes that apply quality assurance and control mechanisms, while responding to variations in demand (Womack and Jones, 1996).

In this general review, the possibility of Lean's known negative effects on manufacturing workforces is explored in the context of healthcare. The article emulates a similar discussion of the theory of Lean, exploring empirical literature and organisational cases to reflect on Lean's success in different contexts (Radnor and Osborne, 2013). To clarify the implications of Lean associated WI, a brief analysis of the Lean healthcare literature containing aspects of WI is presented, which leads to

two propositions that promote a better understanding of Lean's potential links to WI in healthcare workplaces.

The article is therefore structured as follows. First, it overviews the central tenets of Lean and Lean healthcare, followed by the arguments surrounding its links to WI. Next, the literature on Lean associated WI in healthcare is presented and analysed against WI dimensions and introductory processes. From this analysis it is argued that Lean does indeed have a corollary of WI, which needs to be carefully managed if the negative impacts of Lean are not to subordinate its benefits of quality improvement and efficiency. Although the evidence is less than conclusive due to the variability of implementation and deployment contingencies, further research is required not only into Lean associated WI, but also more comprehensively to completely cover the subject of Lean in healthcare. It is within this discussion that the two propositions are presented. The article closes with a short conclusion.

The Theory of Lean and Healthcare

Lean is a management system originally developed as a competitive strategy by the Toyota Motor Corporation (Holweg, 2007) emerging to be an influential feature of modern management (Delbridge, 2007). Lean operates by specifying value in terms of the customer and identifying the elements that maximise that value through waste reduction and workflow improvement (Womack and Jones, 1996). Table 1 presents the principles of Lean which are operationalized through the application of a number of tools or procedures used to identify and reduce waste and optimise productive capability (Bicheno, 2008, Radnor, 2010). Improvement tasks are undertaken by workers supported by a complementary organizational culture (Kaplan *et al.*, 2014). Crucial to Lean is the determination of value, which is defined by customers and focusses on the production or service processes to increase these value adding activities and reduce those that do not, i.e., waste (Womack and Jones, 1996). To achieve this, a significant part of Lean's focus is on continuous improvement activities underpinned by a culture that aims to grow leaders and develop workers

(Liker, 2004) by using multi skilled teams and team-working (Drotz and Poksinska, 2014). While Lean tends to be more associated with repetitive high volume tasks it is able to be implemented in lower volume and higher variety contexts such as software development, small scale manufacturing and in healthcare (DeHoratius and Rabinovich, 2011).

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Introducing Lean to healthcare faces distinct challenges as it seeks to shift the "focus of improvement from individual tasks to the process (or patient pathway), as a set of activities that should be completed in the proper sequence at the proper time to meet patient needs" (Brandao de Souza and Pidd, 2011, p.62). These processes are likely to be controlled by professionals who wield considerable power and autonomy, which is sometimes used to resist change, particularly if it is perceived to be favourable to increase one group's power at the expense of another's (Worthington, 2007). Thus, unlike manufacturing, healthcare is more likely to be associated with professionalised services, meaning that the managers of production and clinicians are likely to differ on what constitutes sufficient evidence for implementing process changes (Young and McClean, 2009). Health institutions are professional organisations, where health professionals undertake their vocational activities under dual control, one through their professional bodies and the other through the institution's administration or management (Hinings, 2004). These interactions occur in an environment of inter– and intra–group rivalry between four interacting and sometimes competing worldviews: those of the doctor, the nurse, the manager and the community (patients or public), which adds to the difficulties and complexity of managing healthcare (Glouberman and Mintzberg, 2001). Healthcare also presents some inconsistencies: in terms of value, whether it is clinical, operational or experiential (Young and McClean, 2008); in terms of processes, as many operational criteria have evolved through numerous improvisations (Spear, 2005, Bohmer, 2010); and for determining who the customer is, as healthcare has a range of internal and external customers (Radnor *et al.*, 2012).

Nevertheless, Lean in healthcare has spread from a few renowned case studies (Radnor *et al.*, 2012) to be increasingly implemented using a variety of approaches; most predominantly as projects or limited scope programmes, although it is expanding to those that are more organisation wide or systematic (Burgess and Radnor, 2013). The implementation of limited scope or unit specific Lean projects leads to what Radnor *et al.* (2012) refer to as disjointed application, the effects of which have managers focussing on actions and tasks rather than a systems or patient journey view. In a similar vein, Tapani *et al.* (2016) indicate that health managers' primary foci are information processing, financial issues and managing operations rather than the organisational issues of strategy, innovation and development, which together act to confound Lean's benefits as an organisational quality improvement methodology (Savage *et al*., 2016). Few systematic implementations of Lean in healthcare have been reported nor are there examples of longitudinal studies, with many reports based on a narrow range of clinical and organisational contexts, limiting the understanding of Lean's applicability to healthcare as a whole (D'Andreamatteo *et al.*, 2015). Lean's implementation is also highly context dependant, leading to actors to translate and transform Lean and to create versions of Lean in response to different contexts (Andersen and Røvik, 2015). Couple this with Savage et al's (2016) observation of Lean being more associated with operational level improvement, then the reasons for Lean's contradictory or conflicting evidence starts to become clearer (Andersen *et al*., 2014). The variability of Lean implementations and their contexts within and across healthcare is therefore problematical for assessing of Lean's performance or its sustained benefits, particularly when seeking cross-national comparisons (Daultani *et al.*, 2015). The absence of a common definition further confuses to performance measurement (D'Andreamatteo *et al*., 2015), although Kaltenbrunner *et al*. (2017) recently favoured Liker's (2004) description of Lean over others, due to its generic principles, its inclusion of Lean's operative and philosophical sides and its appreciation of human resources.

The Negative Impacts of Lean

Lean's productive superiority is underpinned by a combination of improvement practices and HPWS techniques such as team development and employee engagement (Delbridge, 2007, Crowther and Green, 2005). It is claimed that these strategies lead to improved workplace conditions, employee morale and worker autonomy (Worthington, 2007). This claim has been challenged by a number of Lean studies, which have found a range of negative impacts (see Table 2). Some of the worst excesses of these negative impacts are seen to occur when Lean is implemented without its necessary social components (Longoni *et al.*, 2013).

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It is contended that Lean's reliance on the team has replaced the repetitive task workplace stress with a different type of stress created through a culture of problem solving in a more highly surveilled and peer pressured environment (Carter *et al.*, 2011a). Willis (2005) cites the use of job redesign, the bundling of tasks and the advent of multi-skilled teams as an intensifier of work in healthcare through increasing the pace and the number of tasks, reducing down time or space between tasks and the stresses associated with self-managing the workload. Similarly, pressure can be felt from audits and an emphasis on quality control (Willis and Weekes, 2005). However, it has been shown that consistent application of HPWS techniques go some way to reduce Lean's negative impacts on the workforce (Macky and Boxall, 2008, Cullinane *et al.*, 2012) contributing to increased employee engagement, satisfaction and commitment (Ang *et al.*, 2013).

Alternatively, some of Lean's poor results and workplace environments have been linked to management's poor understanding of Lean (Emiliani, 2011), which could be seen as reasonable given the limited studies of worker experiences of Lean in non-manufacturing environments (Carter *et al.*, 2011b). However, this simple explanation is not borne out by recent debate in the academic literature over aspects of Lean's focus, efficacy, appropriateness and implementation methods in

Lean's non-traditional environs (Hartzband and Groopman, 2016, Shook, 2016, Seddon, 2012, Procter and Radnor, 2016, Carter *et al.*, 2016).

Work intensification and Lean healthcare

Though most of what we know of the social aspects of Lean in healthcare comes from accounts of patient flow and wait time improvement studies, some are now beginning to identify social or professional issues arising in workplaces (Mazzocato *et al.*, 2012, Timmons *et al.*, 2014, Waring and Bishop, 2010, Rees, 2014) and examine Lean's conditional nature (D'Andreamatteo *et al*., 2015, Andersen *et al*., 2014). In addition, there are suggestions that not only does Lean not meet its promise for healthcare (Radnor *et al.*, 2012), it struggles to show positive associations with patient satisfaction, patient flows, patient safety and is negatively associated with worker satisfaction (Moraros *et al.*, 2016). This has led to the suggestion that while healthcare may "benefit from interventions that have some resemblance to lean operations" (McCann *et al.*, 2015, p. 1573), its wholesale application across a healthcare organisation may be inappropriate.

Where WI has been specifically identified and associated with Lean implementation, its effects have been linked to fewer staff, additional tasks through workforce reorganisation and role re-classifications (O'Donnell, 1995), increased work pace, government targets and systemic factors such as increasing patient acuity, high bed occupancies and budget constraints (Stanton *et al.*, 2014). Lower skilled staff experience WI through the shifting of unpleasant or repetitive work tasks on to their existing workloads or through altering jobs (O'Donnell, 1995). Stanton *et al.* (2014) indicate those with more skills such as doctors and nurses can also be placed under pressure from increased work pace although professional autonomy and employment terms and conditions may provide doctors the flexibility to avoid some of WI's impacts (Rees, 2011). A survey found that many nurses had poor experiences, with declining time available for care, time for training, staff morale and engagement and close to half experiencing worse workloads and stress resulting from their workplaces' Lean practices (Saskatchewan Union of Nurses, 2014).

WI in healthcare may also increase when "the work is highly structured around teamwork and where all are committed to the service of care" (Willis, 2005, p.572), although team-working has experienced problems becoming established in the context of healthcare quality improvement (Tucker and Edmondson, 2003, Mazzocato *et al.*, 2012, Bamford and Griffin, 2008). Lean teams are composed of multi-skilled workers (Olivella *et al.*, 2008) and preparing a multi-skilled workforce is time consuming, requires training and distracts health workers from their usual duties (Esain *et al.*, 2008). In healthcare, a team member's ability to multi-task is limited by professional and occupational boundaries (Stanton *et al.*, 2014) and other team members' work can be intensified when the team's professional members begin to experience increasing pressure (Willis and Weekes, 2005). These pressures may occur more during Lean's initial implementation, when the transition to Lean's new routines can place additional time demands on healthcare workers (Ballé and Regnier, 2007). It is proposed that improved implementation planning and project scheduling would assist to reduce the additional burden (Harrison *et al.*, 2016). This said, how a Lean implementation progresses is as much planned as it is due to the dynamic actions and interactions of the actors involved (Papadopoulos and Merali, 2008). Moreover, by understanding the nature of these networks of health actors, health managers can monitor shifting positions and allegiances for the identifying objects or actions and use this information to devise appropriate interventions, thereby enabling the projects and actors to remain on track (Papadopoulos *et al*., 2011). The types of objects or actions monitored could be those related to and emblematic of Lean induced WI.

Examining the Lean Healthcare Literature for Indicators of WI

As the literature indicates, WI is a possibility when Lean is used in a workplace. An examination of the Lean healthcare WI literature finds instances of Green's (2001) WI dimensions and Beynon *et al*.'s (2002) and White and Bray's (2003) processes for introduction. Table 3 provides a summary of the WI dimensions instances, while table 4 summarises the instances of the processes of introduction.

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This brief review tends to support that found in wider literature, in particular that: its focus on job design or sizing is more about cost saving or streamlining; and implementation issues dominate - both of which suggest questions surrounding the implementation or reasons for adopting Lean. Significantly, it is often difficult determine when an implementation period ends and work-as-usual begins, further confounding attribution. There is, however, seemingly a link between Lean and WI the dimensions of WI and its introductory processes through the approach to redesigning jobs or how the work is to be conducted. It would have been reasonable to expect to have found more evidence of both of Lean's mutually reinforcing parts, particularly when HPWS actions and people-related processes can soften the potential negative impacts of redesigned jobs and work (Macky and Boxall, 2008, Cullinane *et al.*, 2012, Ang *et al.*, 2013). These ameliorators of Lean's negative impacts are also unable to have an effect as the team based job re-design and task accumulation tended to be undertaken informally within the confines of the teams, with no discernible external or HRM specialist input or, as Tapani *et al.* (2016) point out, the HRM issues are generally left to be "handled elsewhere" (p.11). It could be postulated that having more access to formal work and job design studies or access to specialist advice would alert managers to emerging staff problems or WI issues much earlier. On the other hand, O'Donnell (1995) showed that job design was intentionally used as a cost saving measure to reduce head counts, which Radnor *et al.* (2006) consider to be a poor reason to implement Lean. However, Stanton *et al.* (2014) concluded that the WI they detected could not be attributed to Lean; rather they considered it due to a range of systemic health system and sector funding issues, but they did indicate that senior medical staff may have more ability to absorb increasing pace and volumes resulting from Lean due to their professional autonomy. While, for the lesser skilled staff whose workloads revolve around repetitive routines or tasks of low complexity the risk of experiencing WI can be higher (Willis, 2005, O'Donnell, 1995). This collection

of observations imply that within healthcare's complex and hierarchical environment determining WI causality is particularly difficult.

Perhaps a signal of the potential for Lean associated WI is the relative preparedness of the implementing organisation (Radnor, 2011). There is significant literature on readiness for Lean, with a key aspect being the support and visibility of leadership to influence cultural change (Al-Balushi *et al.*, 2014). The case data in Rees (2011) reveals variation in this key influencer with some hospital leaders viewing Lean as a method to achieve externally set targets or to realise easily achieved cost reductions without necessarily achieving Lean's flow or quality benefits. This supports Radnor and Osborne's (2013) observation that public service leaders may be influenced to change the focus of Lean initiatives in response to policy or financial pressures.

Of equal interest are the benefits experienced by staff from the implementation of Lean when WI is present. As well as detrimental effects, positive effects of Lean are reported. O'Donnell (1995) identifies staff gaining access to useful training and increased time with patients, while Stanton *et al.* (2014) report that Lean brought efficiencies to the ED without any further intensification, with work control and quality initiatives such as visual display boards being welcomed by staff. These outcomes suggest that even though staff may experience increased work pace they can also feel a sense of achievement or satisfaction as a result of Lean, including improved workplace morale (Rees, 2011). This raises the issue that intensification may be somewhat inevitable and so the central issue may actually be how it is to be managed. As Mcintosh (2016) discusses, resistance from disaffected actors creates questions as to how implementation may impact on staff or impinge on professional autonomy, making recovery from or the defence of poor or opaque implementation difficult. This, in itself, suggests that improved understanding of the mechanisms of WI and its attendant problems is desirable.

Towards Understanding Lean Associated WI in Healthcare

The starting point of this article is that Lean has the potential to intensify work. The manufacturing literature contains evidence of these phenomena, with cases also reported in both service industry and public service contexts (Sprigg and Jackson, 2006, Carter *et al.*, 2011a, O'Donnell *et al.*, 1998). Lean has been recently introduced into healthcare and little is known of how and why it works. If, like manufacturing, Lean's use in healthcare brings similar negative effects, then this will limit its effectiveness as a healthcare quality improvement and productivity strategy. A scan of the Lean healthcare WI literature found instances of WI's dimensions and the process by which it is introduced into health workplaces. The literature also reveals a limited regard for implementing Lean's necessary social components pointing to the reliance on Lean's tools and technical practices, without necessarily considering the significant relationship that the technical side has with the social. Effective deployment requires a genuine appreciation of the implications of Lean for the organisation's culture, evaluating Lean's processes and impacts from a user perspective as well as from the patient's (Radnor and Osborne, 2013). Thus, a workplace culture in which staff are genuinely considered and their suggestions discussed and adopted would be advantageous, but this must be weighed against the practicalities of introducing such a workplace system in an environment of already heavy workloads and insufficient resources (McCann *et al.*, 2015). As the literature has revealed, Lean implementations are contingent on a number of factors that affect its progress and practicalities. Issues such as staff reductions as a cost management measure, clinical and non-clinical processes and the re-definition of roles and jobs contribute to implementation variations and differences in the reported outcomes for staff. This variability also makes judgements on whether Lean 'works' in healthcare more subjective and further increasing the attractiveness of narrow research objectives examining cause and effect interventions in response to distinct bottlenecks (McCann *et al.*, 2015), rather than exploring specific operating practices, their management (DeHoratius and Rabinovich, 2011) and change within a volatile organisational context (Stanton *et al.*, 2014). This leads to the first proposition of the article:

Proposition #1. Comprehensive research is required to provide increased insight into Lean's socio-cultural dynamics in the context of healthcare to better explain how and why it works, including the phenomena of intensified work that produces both positive and negative effects for the workforce.

This call includes the consideration of directly studying the negative effects of Lean on employees, how these manifest and the contingencies that promote or restrict them. D'Andreamatteo *et al*. (2015) identifies that the Lean healthcare literature is built on cases of success, so a more critical view is now required for evaluations. Such field based investigations (DeHoratius and Rabinovich, 2011) may shed more light on why an increased work pace provides a sense of accomplishment and more structured work for some, but induces stress and unfavourable conditions for others. These types of data may also address the possible association that Lean induced WI has with the relative skill levels of work. For, while the medical profession has had its dominance and autonomy eroded over recent years (Willis, 2006), this group still exerts significant sway and ability to influence the direction of change (Stanton *et al.*, 2014). This is not the case for all of healthcare's professionals, as other skilled hospital staff feel that their time to provide care and maintain their skills can be adversely affected by Lean work practices (Saskatchewan Union of Nurses, 2014, O'Neill, 2014). As Lean's main mode of work is the team, it is also important to begin to understand the relationships between relative changes in work volumes, pace and intensities for a team's members and the implications for the redesign of processes within and across healthcare environments. It is understood that Lean's association with WI can be somewhat ameliorated through the use of HRM practices. These practices use job sizing, re-design and ergonomics to develop more safe and sustainable roles. However, little formal analysis of the work, new jobs nor the increasing stress and work volumes that the changes induced appear in the literature (Stanton *et al.*, 2014, O'Neill, 2014, Rees, 2011). On many occasions staff were left to their own devices to mediate their work volumes and commitment to care, while increasingly being held to faster work pace and output targets. This leads to the second proposition:

Proposition #2. As the team is a key aspect of Lean's operations, an understanding of the implications of Lean healthcare team-working, including WI factors, across the health workforce and its implications for healthcare process redesign is required as a means to improve quality improvement planning and goal setting.

When developing, forming or planning the Lean healthcare team, the techniques of work design and job design can be beneficial. Work design is how the work is organised and its outcomes for the workers (Parker, 2003), while job design is the responsibilities and tasks assigned to certain jobs in a Lean environment (Cullinane *et al.*, 2012). Coupled with these are the practices of HPWS, although their operationalisation may be different for different groups of health workers, so their application must align with health's multi-disciplinary team work character (Ang *et al*., 2013). At different levels, workers may participate in the self-reinforcing actions of training, performance management and participation in decision-making. It should be noted that there are practical limitations to HRM's influence in healthcare. Health work is complex, with health's numerous actors competing for attention and space, while the work, particularly clinical tasks, may be regulated by entities outside the purview of those attending to HRM issues. Therefore, change in a healthcare setting tends to be controlled and designed by clinical staff (McBride and Mustchin, 2013). This signals a possible reason for the absence of a formal HRM presence and HPWS approaches being discussed in the Lean healthcare WI literature. HPWS practices also align with the concept of good work (Vidal, 2007, Bevan, 2012), which is particularly relevant when organisational or system budget restrictions or cost pressures are present as it provides a means to continue to provide satisfying and safe employment. Regardless of the practical constraints, work has begun on research instruments to help measure the workforce's perceptions of Lean (Kaltenbrunner *et al*., 2017) that should provide knowledge of how to better manage Lean implementation and to further integrate pro-social interventions (Hyde *et al*., 2013). Developing such an organisational culture that supports the social side of Lean and a user perspective is an imperative, for, without it, "Lean is doomed to fail" (Radnor and Osborne, 2013 282). Goodridge *et al*. (2015) indicate that leaders have a significant part

to play in these transformations, particularly when they are authorised to give attention and resources to quality improvement. To assess these workplace cultural devlopments, the monitoring or measurement of certain cultural enablers is required, being careful to consider the specificities of local influences such as government regulation and policy (Machado Guimarães and Crespo de Carvalho, 2014).

Conclusion

This article has argued that not enough is known about Lean healthcare to discount its role in the advent of WI. While much of Lean healthcare literature explores Lean's implementation in a range of contexts, on many occasions the effects on the workforce are ignored. Indeed, much of the literature tends to gloss over important cultural and situational factors within healthcare workplaces, particularly the vulnerability of lesser skilled staff who are more likely to acutely feel the effects of WI. Many of these study sites are now well past their implementation phases and, if returned to, may provide a rich source of data from which to understand mature Lean healthcare work.

Thus, to prompt further research on the possibility of Lean associated WI in healthcare the article contains two propositions. The first encourages more research emphasis on the socio-cultural side of Lean and includes the perceptions of the changes in work and its effects on work and work lives. Whether Lean is successful at reducing waste and improving flow depends very much on sets of contingent variables such as readiness (Radnor, 2011, Rees, 2014), involvement (Drotz and Poksinska, 2014, Timmons *et al.*, 2014, Stanton *et al.*, 2014) and deployment (Burgess and Radnor, 2013, McCann *et al.*, 2015, Waring and Bishop, 2010). Thus, a comprehensive research agenda will need to identify and discuss these variables in as much detail as the technical and workforce aspects of Lean (Machado Guimarães and Crespo de Carvalho, 2014).

Secondly, it is proposed that more data are needed on how healthcare work processes change when Lean is applied. Little is known of the bundle of HPWS practices required at the team

setting, however it is known that clinical leaders tend to control process redesign and it is critical for management to enable workgroups to share a common set of values, objectives and goals in their work (Ang *et al.*, 2013). Reporting of these types of data will assist with strategies to better develop Lean within healthcare contexts and also on how to re-gather and motivate staff already working in Lean teams. A better understanding of healthcare's professional limitations on a team's roles (Stanton *et al.*, 2014) can provide more evidence about the barriers for workforce innovation or redesigned work (Ono *et al.*, 2013, McBride and Mustchin, 2013). Further, there are limited data on the use of HRM specialists and their perspectives in much of the Lean literature and few, if any, details of work and job design interventions when Lean is being introduced. Adding to this knowledge will help to provide direction for how to benefit from applying HPWS techniques as a means to offset Lean's negative effects.

Research Implications

There are few rigorous studies of Lean work and its negative impacts (Parker, 2003, Longoni *et al.*, 2013). Of those that have been published, most find some degree of negative impact on the workers (Cullinane *et al.*, 2012), although there is a consistency issue due to the many variations between Lean implementations and workplaces (Parker, 2003). This could lead us to believe that implications such as WI are indeed inevitable and the question now becomes one of minimising the negative effects.

As such, this article provides a useful starting point for researchers to begin to develop future Lean healthcare WI studies. By using existing WI classification frameworks to analyse Lean healthcare workplaces, the article contributes to a growing body of Lean healthcare's theoretical evidence. Future research may wish to extend on this by aiming to improve the understanding of Lean's impacts in terms of the effective management of people and employee outcomes, particularly in the post implementation to maturity phases of Lean deployment. In terms of instrumentation, Machado Guimarães and Crespo de Carvalho (2014) suggest the use of an adapted Lean assessment

instrument to monitor Lean healthcare deployment and Kaltenbrunner *et al.* (2017) offer an instrument to assess employee perceptions of Lean. Within these assessment frameworks are items that deal with HWPS practices such as work standardisation, job development and planning, cross-training, use of teams, improvement suggestions and health and wellbeing that align with Lean's social side and developing a supportive culture. As HPWS practices are known to amerilorate Lean's negative consequences, improved support or training for Lean leaders could be also become part of the research agenda. Carter *et al.* (2016) provide a framework of public service Lean team-working, which could be adapted and applied to a healthcare context, to begin to understand the Lean healthcare team's limitations and sources of work pressure. As Lean healthcare becomes more embedded, further research will need to be undertaken to investigate a more supportive the role for HRM; for, across industries, "little is known about the involvement of HRM specialists in the introduction of process improvement and on the implications in terms of HR policies and practices" (Bamber *et al.*, 2014, p. 2883).

To close, there are a number of questions being raised over Lean's suitability and efficacy in the healthcare environment (Moraros *et al.*, 2016). Some of these are about the effects Lean has on the workforce. Lean has the propensity to intensify work, but this intensification is not always accompanied by wholly negative impacts. Comparable to the theory of Lean for public services (Radnor and Osborne, 2013), perhaps there is a need to accept Lean healthcare as a socio-technical system and thereby begin to seek more evidence of how Lean works in the context of healthcare (Walshe, 2009), to be better placed to understand its effects on the work itself (Joosten *et al.*, 2009).

References

Al-Balushi, S., Sohal, A., Singh, P. J., Al Hajri, A., Al Farsi, Y. & Al Abri, R. (2014), "Readiness factors for Lean implementation in healthcare settings–A literature review", *Journal of Health Organization and Management,* Vol. 28 No. 2, pp. 135-153.

Andersen, H. & Røvik, K.A. (2015), "Lost in translation: a case-study of the travel of Lean Thinking in a hospital", *BMC Health Services Research,* Vol. 15 No. 401**,** pp. 1-9.

Andersen, H.,Røvik, K.A. & Ingebrigtsen, T. (2014), "Lean Thinking in hospitals: is there a cure for the absence of evidence? A systematic review of reviews.", *BMJ Open,* Vol. 4 No. e003873.

Ang, S.H.,Bartram, T.,McNeil, N.,G., L.S. & Stanton, P. (2013), "The effects of high-performance work systems on hospital employees' work attitudes and intention to leave: a multi-level and

occupational group analysis", *The International Journal of Human Resource Management,* Vol. 24 No. 16**,** pp. 3086-3114.
Ballé, M. & Regnier, A. (2007), "Lean as a learning system in a hospital ward", *Leadership in Health Services,* Vol. 20 No. 1, pp. 33-41.
Bamber, G. J., Stanton, P., Bartram, T. & Ballardie, R. (2014), "Human resource management, Lean processes and outcomes for employees: Towards a research agenda", *The International Journal of Human Resource Management,* Vol. 25 No. 21, pp. 2881-2891.
Bamford, D. & Griffin, M. (2008), "A case study into operational team-working within a UK hospital", *International Journal of Operations and Production Management,* Vol. 28 No. 3, pp. 215 - 237.
Bevan, S. (2012), *Good Work, High Performance and Productivity*, The Work Foundation (Lancaster University), London.
Beynon, H., Grimshaw, D., Rubery, J. & Ward, K. (2002), *Managing Employment Change: The New Realities of Work,* Oxford University Press, Oxford.
Bicheno, J. (2008), *The Lean Tool Box for Service Systems,* PICSIE Books, Buckingham.
Bohmer, R. M. J. (2010), "Fixing Health Care on the Front Lines", *Harvard Business Review,* Vol. 88 No. 4, pp. 62-69.
Brandao De Souza, L. & Pidd, L. (2011), "Exploring the Barriers to Lean Healthcare Implementation", *Public Money and Management,* Vol. 31 No. 1, pp. 59-66.
Burgess, N. & Radnor, Z. (2013), "Evaluating Lean in healthcare", *International Journal of Health Care Quality Assurance,* Vol. 26 No. 3, pp. 220-235.
Carter, B., Danford, A., Howcroft, D., Richardson, H., Smith, A. & Taylor, P. (2011a), "'All they lack is a chain': Lean and the new performance management in the British civil service", *New Technology, Work and Employment,* Vol. 26 No. 2, pp. 83-97.
Carter, B., Danford, A., Howcroft, D., Richardson, H., Smith, A. & Taylor, P. (2011b), "Lean and mean in the civil service: The case of processing in HMRC", *Public Money & Management,* Vol. 31 No. 2, pp. 115-122.
Carter, B., Danford, A., Howcroft, D., Richardson, H., Smith, A. & Taylor, P. (2013), "'Stressed out of my box': Employee experience of Lean working and occupational ill health in clerical work in the UK public sector", *Work, Employment and Society,* Vol. 27 No., pp. 747-767.
Carter, B., Danford, A., Howcroft, D., Richardson, H., Smith, A. & Taylor, P. (2016), "Uncomfortable truths - teamworking under Lean in the UK", *The International Journal of Human Resource Management.* DOI: 10.1080/09585192.2015.1111251.
Crowther, D. & Green, M. (2005), *Organisational Theory,* Chartered Institute of Personnel and Development, London.
Cullinane, S.-J., Bosak, J., Flood, P. C. & Demerouti, E. (2012), "Job design under Lean manufacturing and its impact on employee outcomes", *Organizational Psychology Review,* Vol. 3, pp. 41–61.
D'Andreamatteo, A.,Iannia, L.,Legab, F. & Sargiacomoa, M. (2015), "Lean in healthcare: A comprehensive review", *Health Policy,* Vol. 119**,** pp. 1197–1209.
Daultani, Y., Chaudhuri, A. & Kumar, S. (2015), "A decade of Lean in Healthcare: Current state and future directions", *Global Business Review,* Vol. 16 No. 6, pp. 1082-1099.
Dehoratius, N. & Rabinovich, E. (2011), "Field research in operations and supply chain management", *Journal of Operations Management,* Vol. 29 No. 5, pp. 371-375.
Delbridge, R. (2007), "HRM and contemporary manufacturing". *In:* Boxall, P., Purcell, J. & Wright, P. (eds.) *The Oxford Handbook of Human Resource Management.* Oxford University Press, Oxford, pp. 405-427.
Delbridge, R., Turnbull, P. & Wilkinson, B. (1992), "Pushing back the frontiers: management control and work intensification under JIT/TQM factory regimes", *New Technology, Work and Employment,* Vol. 7 No. 2, pp. 97-106.

Drotz, E. & Poksinska, B. (2014), "Lean in healthcare from employees' perspectives", *Journal of Health Organization and Management,* Vol. 28 No. 2, pp. 177-195.
Emiliani, B. (2011), "Lean management failure at HRMC", *Management Services,* Vol. 55 No. 4, pp. 13-15.
Esain, A., Williams, S. & Massey, L. (2008), "Combining planned and emergent change in a healthcare Lean transformation", *Public Money & Management,* Vol. 28 No. 1, pp. 21-26.
Gee, J. P., Hull, G. & Lankshear, C. (1996), *"The New Work Order: Behind The Language of the New Capitalism",* Allen & Unwin Pty, St Leonards, NSW 2065.
Glouberman, S. & Mintzberg, H. (2001), "Managing the care of health and the cure of disease-Part I: Differentiation", *Health Care Management Review,* Vol. 26 No. 1**,** pp. 56-69.
Goodridge, D.,Westhorp, G.,Rotter, T.,Dobson, R. & Bath, B. (2015), "Lean and leadership practices: Development of an initial realist program theory", *BMC Health Services Research,* Vol. 15 No. 362**,** pp. 1-15.
Green, F. (2001), "It's Been A Hard Day's Night: The Concentration and Intensification of Work in Late Twentieth-Century Britain", *British Journal of Industrial Relations,* Vol. 39 No. 1, pp. 53-80.
Harrison, M. I., Paez, K., Carman, K. L., Stephens, J., Smeeding, L., Devers, K. J. & Garfinkel, S. (2016), "Effects of organizational context on Lean implementation in five hospital systems", *Health Care Management Review,* Vol. 41 No. 2, pp. 127-144.
Hartzband, P. & Groopman, J. (2016), "Medical Taylorism", *The New England Journal of Medicine,* Vol. 374 No. 2, pp. 106-108.
Hasle, P., Bojesen, A., Jensen, P. L. & Bramming, P. (2012), "Lean and the working environment: A review of the literature", *International Journal of Operations & Production Management,* Vol. 32 No. 7, pp. 829-849.
Heisig, U. (2009), "The deskilling and upskilling debate". *In:* Maclean, R. & Wilson, D. (eds.) *International Handbook of Education for the Changing World of Work.* Springer Netherlands, Bonn, pp. 1639-1651.
Hinings, C.R. (2004), "Professions in organizations". *In:* Smelser, N. J. & Baltes, P. B. (eds.) *International encyclopedia of the social and behavioral sciences.* Amsterdam: Elsevier.
Holden, R. J. (2011), "Lean Thinking in emergency departments: A critical review", *Annals of Emergency Medicine,* Vol. 57 No. 3, pp. 265-278.
Holweg, M. (2007), "The genealogy of lean production", *Journal of Operations Management,* Vol. 25 No. 2, pp. 420-437.
Hyde, P.,Harris, C. & Boaden, R. (2013), "Pro-social organisational behaviour of health care workers", *The International Journal of Human Resource Management,* Vol. 24 No. 16**,** pp. 3115-3130.
Joosten, T., Bongers, I. & Janssen, R. (2009), "Application of Lean Thinking to health care: issues and observations", *International Journal for Quality in Health Care,* Vol. 21 No. 5, pp. 341-347.
Kaltenbrunner, M.,Bengtsson, L.,Mathiassen, S.E. & Engström, M. (2017), "A questionnaire measuring staff perceptions of Lean adoption in healthcare: development and psychometric testing", *BMC Health Services Research,* Vol. 17 No. 235**,** pp. 1-11.
Kaplan, G. S., Patterson, S. H., Ching, J. M. & Blackmore, C. C. (2014), "Why Lean doesn't work for everyone", *BMJ Quality and Safety,* Vol. 23, pp. 970-973.
Knights, D. & Willmott, H. (2007), *Introducing Organizational Behaviour and Management,* Thomson Learning, London.
Landsbergis, P. A., Chaill, J. & Schnall, P. (1999), "The impact of lean production and related new systems of work organization on worker health", *Journal of Occupational Health Pyschology,* Vol. 4 No. 2, pp. 108-130.
Liker, J. (2004), *The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer,* New York, McGraw-Hill.

Longoni, A., Pagell, M., Johnston, D. & Veltri, A. (2013), "When does lean hurt?–an exploration of lean practices and worker health and safety outcomes", *International Journal of Production Research,* Vol. 51 No. 11, pp. 3300-3320.

Lucey, J., Bateman, N. & Hines, P. (2005), "Why major Lean transitions have not been sustained", *Management Services,* Vol. 49 No. 2, pp. 9-13.

Machado Guimarães, C. & Crespo De Carvalho, J. (2014), "Assessing Lean deployment in healthcare—A critical review and framework", *Journal of Enterprise Transformation,* Vol. 4 No. 1, pp. 3-27.

Macky, K. & Boxall, P. (2008), "High-involvement work processes, work intensification and employee well-being: A study of New Zealand worker experiences", *Asia Pacific Journal of Human Resources,* Vol. 46 No. 1, pp. 38-55.

Mazzocato, P., Holden, R. J., Brommels, M., Aronsson, H., Bäckman, U., Elg, M. & Thor, J. (2012), "How does Lean work in emergency care? A case study of a lean-inspired intervention at the Astrid Lindgren Children's hospital, Stockholm, Sweden", *BMC Health Services Research,* Vol. 12 No. 1, pp. 1-13.

McBride, A. & Mustchin, S. (2013), "Crowded out? The capacity of HR to change healthcare work practices", *The International Journal of Human Resource Management,* Vol. 24 No. 16**,** pp. 3131-3145.

McCann, L., Hassard, J. S., Granter, E. & Hyde, P. J. (2015), "Casting the Lean spell: The promotion, dilution and erosion of lean management in the NHS", *human relations,* Vol. 68 No. 10, pp. 1557-1577.

Mcintosh, T. (2016), "Rolling-out Lean in the Saskatchewan Health Care System: Politics derailing policy", *Health Reform Observer - Observatoire des Réformes de Santé,* Vol. 4 No. 1, Article 3**,** pp. 1-11.

Moraros, J., Lemstra, M. & Nwankwo, C. (2016), "Lean interventions in healthcare - do they actually work? A systematic literature review", *International Journal for Quality in Health Care,* Advanced access, pp. 1-16. DOI: 10.1093/intqhc/mzv123.

O'Donnell, M. (1995), "Empowerment or enslavement?: Lean production, immigrant women and service work in public hospitals", *Labour & Industry: a journal of the social and economic relations of work,* Vol. 6 No. 3, pp. 73-94.

O'Donnell, M., Peetz, D. & Allan, C. (1998), *What's happening at work? More tasks, less job security and work intensification*, Working Paper Series, School of Industrial Relations and Organisational Behaviour, Sydney.

Olivella, J., Cuatrecasas, L. & Gavilan, N. (2008), "Work organisation practices for lean production", *Journal of Manufacturing Technology Management,* Vol. 19 No. 7, pp. 798-811.

O'Neill, L. (2014), *Regulating hospital social workers and nurses: Deskilling and resistance in Lean health care,* Doctor of Philosophy, McMaster University.

Ono, T., Lafortune, G. & Schoenstein, M. (2013), "Health workforce planning in OECD countries: A review of 26 projection models from 18 countries", *OECD Health Working Papers, No. 62.* OECD Publishing, Paris, pp. 1-130.

Papadopoulos, T. & Merali, Y. (2008), "Stakeholder network dynamics and emergent trajectories of Lean implementation projects: A study in the UK National Health Service", *Public Money & Management,* Vol. 28 No. 1**,** pp. 41-48.

Papadopoulos, T.,Radnor, Z. & Merali, Y. (2011), "The role of actor associations in understanding the implementation of Lean Thinking in healthcare", *International Journal of Operations & Production Management,* Vol. 31 No. 2 pp. 167-191.

Parker, S. K. (2003), "Longitudinal effects of Lean production on employee outcmes and the mediating role of work charateristics", *Journal of Applied Psychology,* Vol. 88 No. 4, pp. 620-634.

Procter, S. & Radnor, Z. (2016), "Teamworking and Lean revisited: a reply to Carter et al.,", *The International Journal of Human Resource Management*. DOI: 10.1080/09585192.2015.1111252.
Radnor, Z. & Osborne, S. P. (2013), "Lean: A failed theory for public services?", *Public Management Review,* Vol. 15 No. 2, pp. 265-287.
Radnor, Z. (2010), "Transferring Lean into government", *Journal of Manufacturing Technology Management,* Vol. 21 No. 3, pp. 411-428.
Radnor, Z. (2011), "Implementing Lean in health care: Making the link between the approach, readiness and sustainability", *International Journal of Industrial Engineering and Management,* Vol. 2 No. 1, pp. 1-12.
Radnor, Z. J., Holweg, M. & Waring, J. (2012), "Lean in healthcare: The unfilled promise?", *Social Science & Medicine,* Vol. 74 No. 3, pp. 364-371.
Radnor, Z., Walley, P., Stephens, A. & Bucci, G. (2006), *Evaluation of the Lean approach to business management and its use in the public sector*, Office of Chief Researcher, Scottish Executive, Edinburgh.
Rees, G. H. (2011), *Lean Thinking in New Zealand Emergency Departments,* Master of Commerce, University of Otago.
Rees, G. H. (2014), "Organisational readiness and Lean Thinking implementation: Findings from three emergency department case studies in New Zealand", *Health Services Management Research,* Vol. 27 No. 1-2, pp. 1-9.
Saskatchewan Union of Nurses (2014), *Lean healthcare 2014 member survey*, Praxis Analytics, Regina.
Savage, C.,Parke, L.,Von Knorring, M. & Mazzocato, P. (2016), "Does Lean muddy the quality improvement waters? A qualitative study of how a hospital management team understands Lean in the context of quality improvement", *BMC Health Services Research,* Vol. 16 No. 588**,** pp. 1-9.
Seddon, J. (2012), "Debate: Academia can tax one's patience", *Public Money & Management,* Vol. 32 No. 2, pp. 127-128.
Shah, R. & Ward, P. T. (2007), "Defining and developing measures of Lean production", *Journal of Operations Management,* Vol. 25 No. 4, pp. 785-805.
Shook, J. Y. (2016). *Malpractice in the New England Journal of Medicine,* The Lean Post [Online]. [Accessed February 27, 2016].
Sloan, T., Fitzgerald, A., Hayes, K. J., Radnor, Z., Sohal, A. & Robinson, S. (2014), "Lean in healthcare–history and recent developments", *Journal of Health Organization and Management,* Vol. 28 No. 2, pp. 130–134.
Smith, T. (2000), *Technology and Capital in the Age of Lean Production: A Marxian Critique of the New Economy,* State University of New York Press, New York.
Spear, S. J. (2005), "Fixing health care from the inside, today", *Harvard Business Review,* Vol. 83 No. 9, pp. 78-91.
Sprigg, C. A. & Jackson, P. R. (2006), "Call centers as Lean service environments: Job-related strain and the mediating role of work design", *Journal of Occupational Health Psychology,* Vol. 11 No. 2, pp. 197-212.
Stanton, P., Gough, R., Ballardie, R., Bartram, T., Bamber, G. J. & Sohal, A. (2014), "Implementing Lean management/Six Sigma in hospitals: Beyond empowerment or work intensification?", *The International Journal of Human Resource Management,* Vol. 25 No. 21, pp. 2926-2940.
Stewart, P., Murphey, K., Danford, A., Richardson, T., Richardson, M. & Wass, V. (2009), *We Sell Our Time No More: Workers' Struggles Against Lean Production in the British Car Industry,* Pluto Press, London.
Tapani, J.,Tiirinki, H.,Bloigu, R. & Turkki, L. (2016), "Lean Thinking in Finnish healthcare", *Leadership in Health Services,* Vol. 29 No. 1**,** pp. 9-36.

Timmons, S., Coffey, F. & Vezyridis, P. (2014), "Implementing Lean methods in the Emergency Department: The role of professions and professional status", *Journal of Health Organization and Management,* Vol. 28 No. 2, pp. 214-228.

Tucker, A. L. & Edmondson, A. C. (2003), "Why hospitals don't learn from failures", *California Management Review,* Vol. 45 No. 2, pp. 55-72.

Vidal, M. (2007), "Lean production, worker empowerment, and job satisfaction: A qualitative analysis and critique", *Critical Sociology,* Vol. 33 No. 1-2, pp. 247-278.

Walshe, K. (2007), "Understanding what works—and why—in quality improvement: The need for theory-driven evaluation", *International Journal for Quality in Health Care,* Vol. 19 No. 2, pp. 57-59.

Walshe, K. (2009), "Pseudoinnovation: the development and spread of healthcare quality improvement methodologies", *International Journal for Quality in Health Care,* Vol. 21 No. 3, pp. 153–159.

Waring, J. J. & Bishop, S. (2010), "Lean healthcare: Rhetoric, ritual and resistance", *Social Science & Medicine,* Vol. 71 No. 7, pp. 1332-1340.

White, N. & Bray, M. (2003), "The changing role of nursing unit managers: A case of work intensification?", *Labour & Industry,* Vol. 14 No. 2, pp. 1-19.

Willis, E. (2006), "Introduction: Taking stock of medical dominance", *Health Sociology Review,* Vol. 15 No. 5, pp. 421-431.

Willis, E. M. & Weekes, K. (2005), "Work Intensification for Personal Service Attendants and Medical Scientists". *In:* Stanton, P., Willis, E. M. & Young, S. (eds.) *Workplace Reform in the Healthcare Industry : The Australian Experience,* Palgrave Macmillan, New York, pp. 150-169.

Willis, E. M. (2005), *The hidden traps in multi-tasking: The experience of work intensification for personal service attendants in the healthcare sector*, AIRAANZ refereed papers, Sydney.

Womack, J. P. & Jones, D. T. (1996), *Lean Thinking,* Simon & Schuster, New York.

Worthington, F. (2007), "Change and innovation: New organisational forms". *In:* Knights, D. & Willmott, H. (eds.) *Introducing Organizational Behaviour and Management,* Thomson Learning, London, pp. 375-404.

Young, T. P. & McClean, S. I. (2008), "A critical look at Lean Thinking in healthcare", *Quality and Safety in Health Care,* Vol. 17 No. 5, pp. 382-396.

Young, T. P. & McClean, S. I. (2009), "Some challenges facing Lean Thinking in healthcare", *International Journal for Quality in Health Care,* Vol. 21 No. 5, pp. 309-310.

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Table 1. The five principles of Lean Thinking

Principle	
1.	Specify value from the standpoint of the end customer.
2.	Identify all the steps in the value stream, eliminating whenever possible those steps that do not create value.
3.	Make the value-creating steps occur in tight sequence so the product will flow smoothly toward the customer.
4.	As flow is introduced, let customers pull value from the next upstream activity.
5.	As value is specified, value streams are identified, wasted steps are removed, and flow and pull are introduced. Repeat this process again and continue it until a state of perfection is reached in which perfect value is created with no waste.

Source: (Womack and Jones, 1996)

Table 2. Negative impacts of Lean found in workplaces

Negative Impact	Cause or Effects	Citation
Deskilling	Standardized work routines and narrowing of skills	Heisig (2009), Lucey *et al.* (2005) Carter *et al.* (2011b)
Increased Stress	Increasing production pace, harder work at continuous tasks	Crowther and Green (2005), Landsbergis *et al.* (1999)
	Increasing intensity of effort to perform tasks	Stewart *et al.* (2009)
	Removal of non-value adding motions and re-design of work	Smith (2000), Carter *et al.* (2013)
	Management by blame culture and workplace conflict from team interactions	Delbridge *et al.* (1992), O'Donnell (1995), (Lucey *et al.*, 2005),
Increased job-related strain	Increasing production pace, process simplification	Sprigg and Jackson (2006), Carter *et al.* (2013), Landsbergis *et al.* (1999)
Work Intensification	Harder work at continuous tasks, removal of non-value adding motions and re-design of work	Delbridge *et al.* (1992), Gee *et al.* (1996), Smith (2000), Carter *et al.* (2011a).

Table 3. WI dimensions found in the literature

WI Dimension	Description	Citation
Extensive work effort (Working longer or doing more)	Working longer hours	Rees (2011)
	Task prioritization	O'Neill (2014), Rees (2011)
	Standardised tasks	O'Donnell (1995), Stanton et al. (2014), Rees (2011), O'Neill (2014)
	Less time for tasks	O'Donnell (1995), O'Neill (2014), Rees (2011)
	Work completed out-of-hours	Rees (2011)
Intensive work effort (Working harder or coping with less staff)	On the job training competing with work tasks	Rees (2011)
	New work routines	O'Donnell (1995), Stanton et al. (2014), O'Neill (2014), Rees (2011)
	Time pressure akin to stress	O'Donnell (1995), Stanton et al. (2014), O'Neill (2014), Rees (2011)
	Increased pace of work	O'Donnell (1995), Stanton et al. (2014), O'Neill (2014), Rees (2011),
	Eventual routine stabilisation	Stanton et al. (2014), Rees (2011)
	Continued workload pressures	O'Neill (2014), Rees (2011)

Table 4. WI introductory processes found in the literature

WI introductory process	Description	Citation
Focus on the customer	Benefits for patients identified	Rees (2011)
	'Who the customer is' infrequently identified.	Rees (2011)
	Less time for patients	O'Neill (2014)
	Implementation driven by external considerations	Rees (2011), O'Neill (2014), O'Donnell (1995)
Controls placed on work	Visual progress boards	Rees (2011)
	External performance measures	Rees (2011), O'Neill (2014)
Redesign of jobs	No identifiable process of job redesign or assessment	Rees (2011), O'Neill (2014)
	Duplication and double handling	O'Neill (2014)
	Accumulation of responsibilities or tasks	O'Neill (2014), O'Donnell (1995)
	Elimination of down time, constant workloads	O'Donnell (1995)
	Workers to effectively manage their own time and tasks	Rees (2011), O'Neill (2014), O'Donnell (1995)
	New roles developed in response to increasing conflict with existing duties	Rees (2011)
	Senior clinicians able to minimise interruption to professional routines	Rees (2011)
Increase in work volumes	Increasing demand	Rees (2011)
	Budget and staffing pressures	Rees (2011), O'Donnell (1995)
	Additional work experienced during implementation	Rees (2011), O'Neill (2014)
	Increased flow and pace	O'Donnell (1995)