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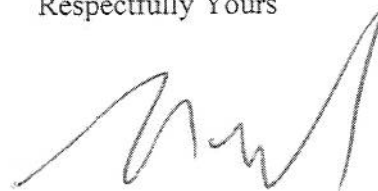
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Dear Fellows Council Members: The research methodology that was undertaken to research this manuscript was vetted and approved by the Interior Health Authority Research and Ethics Board. Approval for this retrospective case study was provided on January 9, 2013. The Interior Health Authority Research and Ethics Board is guided by the Tri-Council Policy Statement, which prescribes ethical conduct for research involving humans (Interagency Advisory Panel on Research Ethics, 2002).

No assistance was received by the author in the collection, collation, interpretation, or dissemination of the data.

Respectfully Yours

A handwritten signature in black ink, appearing to read 'Mark Pugh', with a stylized flourish at the end.

Mark Pugh, C.H.E

KEY MESSAGES

This retrospective case study investigates human resource implications resulting from the implementation of a LEAN initiative, also known as the Toyota production model, in the Laboratory Services facility in Royal Inland Hospital, Kamloops, British Columbia. The effects of the implementation on staff recruitment, retention, and morale are presented, as is an analysis of the change management techniques used during the initiative. A literature review of three themes – change management, the LEAN production system, and recruitment and retention – provides the academic foundation for the research. Data collected from staff involved in the LEAN transformation is analyzed and related back to the literature. Findings of a dramatic increase in staff dissatisfaction are analyzed, resulting in recommendations to assist the organization with future LEAN initiatives. The research demonstrates that successful implementation of future LEAN initiatives is driven by clear communication with front line staff about the need for LEAN in the workplace.

EXECUTIVE SUMMARY

This retrospective case study examined the human resource implications resulting from implementation of a LEAN initiative at Royal Inland Hospital (RIH) in Kamloops, British Columbia. The use of LEAN, or Toyota Production Method, has been increasing in the Canadian health care setting in the past decade.

Context

The study looked at the implementation of a LEAN initiative involving laboratory services at a large tertiary hospital governed by a large health authority. Laboratory services works within a complex matrix of regulatory agencies, unions, and other external system that both influence and are influenced by any of the parties.

The research question that guided the original study were: What were the human resource implications of implementing a LEAN process in laboratory services? What, if any, leadership strategies can be employed to support successful change? How has the implementation of the LEAN process affected the job satisfaction of the workers?

Approach

An action research model was used to guide the original study. Action research can be defined as “ a systematic approach to investigation that enables people to find effective solutions to problems they confront in their everyday lives” (Stringer, 2007, p. 1).

The majority of the data collected from the project participants, laboratory services staff members, was qualitative. Two tools were used to collect the data: 1.) Anonymous surveys 2.) Semi-structured interviews. No physicians were included in the surveys as they are not employees but rather contracted users of laboratory services.

The data was sorted into subgroups of related themes, ideas and thoughts. The theories of Ryan and Bernard (2003) were used to determine themes. The words “communication” and “lack of communication” appeared frequently in the data, as well as metaphors likening the staff to “robots” and “children”.

Literature Review/Evidence

An extensive literature review on 3 primary areas was undertaken. The review focused on: change management, LEAN production system, and recruitment and retention of staff.

Change Management

Jimmieson, Peach, and White (2008) proposed “ Organizational change management is concerned with facilitation the process of change through modifications of strategies, structures, and process” (p. 247). Guowei (2007) postulates that there are 3 primary reasons why change initiatives fail: Secrecy, betrayal, and a perception of control.

LEAN Production System

The term LEAN was coined by Womak, Jones, and Roos (1990) during their study of the Toyota Production Model. LEAN is not an acronym. It is meant to envision a lean operation with little or no fat. The seven areas of potential waste focused on during the implementation of a LEAN process are; “ Inventory, Overproduction, Waiting, Transportation, Defects, Excess Motion, and Processing “ (Blecker-Shelly, 2008, p. 120).

LEAN is a good fit for health care for a variety of reasons. The concepts and tools are simple and agile, and require little fine-tuning between different departments of facilities. LEAN can also be applied at the frontline, where staff often feel the lack of power to make changes in their areas of work (Staus, 2008).

Recruitment and Retention

The cost to replace a staff member in a hard-to-fill position can reach as high as 150% of the annual salary of the position (Capko, 2007). Retention of existing employees is paramount to health care.

There are three primary reasons why people leave health care. 1.) unsociable hours 2.) lack of management support 3.) workload. The use of a LEAN initiative would appear to address these issues.

Results

The results of the study were shocking. 21.7% of the frontline staff involved in the LEAN initiative responded that they had changed their retirement plans. The intent was to retire sooner than anticipated due to the stress associated with the new initiative. Many of the staff also felt that the morale and the atmosphere in the department had declined since the LEAN implementation. A demonstrated decline in job satisfaction was also documented.

Implications and Knowledge Translation

LEAN should be viewed from a system-wide or holistic viewpoint prior to implementation. LEAN is not a quick fix for issues. It is a cultural shift that must be implemented with forethought and an appreciation for the tools required for a significant cultural shift.

CHAPTER 1

CONTEXT

This project involves a retrospective case study of the human relation outcomes generated by the implementation of a “LEAN process” in a health care environment, , in this case, laboratory services at Royal Inland Hospital (RIH) in Kamloops, British Columbia, which is operated by the Interior Health Authority (IHA), and how these outcomes affected the operation of the department. Staus (2008) describes the LEAN process as “a process to examine all the necessary steps required to create a product or service, and eliminates unnecessary or redundant steps” (Staus, 2008, p.1)

LEAN operating principles have been in use in the private sector, in one form or another, for many years in an effort to boost productivity and/or profit. The LEAN process involves “a systematic approach to identifying and eliminating waste through continuous improvement, flowing the product at the pull of the customer in pursuit of perfection” (Kilpatrick, 2003, p. 1). Healthcare organizations have been reluctant to examine this process in the past; however, with current labour shortages being felt throughout the healthcare industry, attention is now being focused on doing more with less. LEAN implementation will allow healthcare organizations to be poised for forecasted labour shortages over the next decade. According to Human Resources and Social Development Canada, “pressures are particularly acute for physicians, nurses, pharmacists, medical technologists and technicians and assisting occupations in support of health services” (Human Resources and Skills Development Canada (HRSDS) 2007, Labour Market Prospects section, ¶ 4).

Research Questions

The research question that guided the original study was: What were the human resource implications of implementing a LEAN process in RIH Laboratory Services? Sub-questions included: What, if any, leadership strategies can be employed to support successful change? How has the implementation of the LEAN process affected the job satisfaction of the workers?

The Opportunity and its Significance

The Interior Health Authority began implementing the LEAN process at all laboratory services departments in January of 2008. This was a staged process to be implemented in the six largest locations. The start date for the Royal Inland Hospital project was January, 2009. The laboratory services department at RIH is a relatively small department comprised of approximately 64 full time equivalents (FTE). The LEAN process is intended to create efficiencies within an organization and to strive for greater quality control. The human side of the LEAN process has been widely studied in the business sector, but there has been little research on the implementation of LEAN processes in healthcare. It has been my experience that for many years healthcare has not been mandated to adopt a business model to decrease costs and improve efficiencies. While the LEAN process will help with these initiatives, it is important to understand what potential positive and negative outcomes may result from adopting a LEAN philosophy. The significance of this opportunity is vast due to the fact that plans to undertake LEAN transformations in other departments within the IHA are currently being considered.

It is very important that the organization understands and anticipates what human resource issues may arise from the implementation of the LEAN process. As we progress towards anticipated issues with recruitment and retention, any negative connotation associated

with a LEAN process must be dispelled in order to avoid the departure of veteran staff.

Conducting research with a small sample group allowed for a more in-depth analysis of issues that may present themselves in the future.

Stakeholders, in this case staff and patients, also needed to have input into this process. As an experienced healthcare administrator in healthcare I have often witnessed many well-laid plans fail due to lack of stakeholder involvement, and failure to acknowledge stakeholders' ideas and comments in the final planning stages.

Systems Analysis of the Opportunity

As is the case with many segments of healthcare, laboratory services works within a complex matrix of regulatory agencies, unions, and other external systems that both influence and are influenced by decisions made by any of the parties. While the regulatory agencies are important stakeholders, perhaps the most important players in this equation are the trade unions that represent the employees. Without the union's acceptance of this new initiative, LEAN is doomed to fail. In laboratory services, the staff are the lynchpin of the operation. The machines that process the samples and identify abnormalities cannot operate without the input of an employee; as such, the success or failure of this initiative will rest with the staff.

Organizational Context

The Interior Health Authority was formed in December, 2001 when the "government streamlined 52 health regions with competing or overlapping mandates into six health authorities.... [T]he province has been able to maximize the resources available for direct patient care" (Interior Health Authority, 2015, Home, ¶2). The corporate offices of the IHA are located in Kelowna, and the landmass within its borders is 200,000 square kilometres. The IHA serves a population of 714,000 residents and this population is expected to grow at 4% per year over the

next five years (B.C. Ministry of Labour and Citizens' Services, 2014). The IHA has 19,000 employees, 1,500 physicians in 45 acute care hospitals, and a yearly budget of \$2.0 billion dollars (IHA, 2015).

Royal Inland Hospital is one of two tertiary care centres within the IHA. While Laboratory Services for RIH are located within the building, it is considered a corporate department. As a corporate department, a clearly defined reporting structure does not exist within the facility.

The IHA's mission is to "promote healthy lifestyles and provide needed health services in a timely, efficient manner, to the highest professional and quality standards" (Interior Health Authority, 2015, Our Mission section, ¶1). The mission is accompanied by 12 strategic objectives. The 8th strategic objective is to "effectively exploit available and emerging technology to improve diagnostic and treatment services...and provide the comprehensive business management systems required to operate a complex operation" (Interior Health Authority, 2015, IMIT Orientation section, ¶8).

The study of the implementation of a LEAN process in the system is congruent with both the mission statement and the 8th strategic objective. The LEAN process is, in its simplest form, a tool used to examine the steps in any given process and look for efficiencies in that process.

The decision to review alternative production methods within the IHA is at a very early developmental stage. To my knowledge, there has not been any research within the organization that investigates the implementation of LEAN processes and their potential impact on human relations. The decision to continue the implementation of LEAN processes throughout the IHA has been made, and the findings of this action research project provided valuable information for future endeavours.

CHAPTER 2

APPROACH

This project was intended to study the human resource implications of implementing a LEAN process in a healthcare environment. The research question that guided this project was: What are the human resource implications of implementing a LEAN process in RIH Laboratory Services? Sub-questions included: What, if any, leadership strategies can be employed to support successful change? How has the implementation of the LEAN process affected the job satisfaction of the workers?

The implementation of LEAN processes has been studied with respect to the outcomes for private industry – the ground-breaking work of Krafcik (1988) for example, however the literature regarding this experience in healthcare is limited.

Research Approach

Action Research

An action research model was used to guide this study. Action research can be defined as a “systematic approach to investigation that enables people to find effective solutions to problems they confront in their everyday lives” (Stringer, 2007, p. 1). Action research may also be seen as “an emergent inquiry process in which applied behavioural science knowledge is integrated with existing organizational knowledge and applied to solve real organizational problems” (Coughlan & Brannick, 2007, p. 3). Action research allows the researcher to look at organizational problems and use their research to find a solution to the problem. It differs from the traditional quantitative research model in the way in which the data is interpreted.

An action research model was used in this project for a variety of reasons. First and foremost, the majority of the data collected was qualitative, which lends itself well to action research. The magnitude of the change at RIH would require many years of statistical data to draw any conclusions of the success or failure of the initiative.

A second and equally important reason for using an action research method is the notion of the research being a collaborative democratic partnership (Coughlan & Brannick, 2007). The research participants were made aware that the senior executive team had reviewed this project when it is completed in order to make any necessary changes to future initiatives. This knowledge made the researcher, in the eyes of the research subjects, a channel through whom to convey a message of displeasure or optimism to the group steering the organization.

Qualitative Research

The data collected during the study was of a qualitative nature. “Qualitative research methods are used to understand some social phenomena from the perspectives of those involved, to contextualize issues in their particular socio-political milieu, and sometimes to transform or change social conditions” (Glesne, 2006, p. 4).

The decision of what type of research methodology to use – either qualitative or quantitative– can often be made by examining the question being asked. As Palys and Atchison (2008) state, “Practitioners of qualitative and quantitative methods may seem to have different philosophies of science, but they really just work in different situations and ask different questions” (p. 19). In this study, the questions concerned employees’ views of how the implementation of the LEAN process was carried out and were therefore by their nature qualitative.

Project Participants

The project participants for this study were the laboratory services staff at Royal Inland Hospital in Kamloops, British Columbia. These front-line staff were directly impacted by the implementation of the LEAN process; therefore their interpretations of how the process was facilitated would be invaluable. I do not have any administrative or personal ties to the department, and therefore did not anticipate any ethical or conflict of interest issues with using this department as a test group for this study.

Invitations to participate in the online survey were sent to 70 employees who work in the Laboratory. This figure represents all employees of the laboratory, including casual employees. Physicians associated with the laboratory, pathologists for example, were excluded from the survey due to the nature of their employment. The physicians are not employed by the IHA, and provide service to the facility on a fee for service basis.

Research Methods

Research Tools

Two data collection tools were used in the study. The first tool was an anonymous survey, which was conducted online using the Survey Monkey platform. Rossi, Wright, and Anderson (1983) state “sample surveys are currently one of the more important basic research methods...and an important tool for applied purposes in both the public and private sectors” (p. 1). The third-party email inviting RIH Laboratory staff to participate in the survey was sent on March 5, 2009, and a follow up email was sent on March 26, 2009 indicating the closing date of the survey.

A seven- step process, as outlined by Burgess (2001), assisted me in the development of the survey questions: (1) define the research aims; (2) identify population and sample; (3) decide

how to collect replies; (4) questionnaire design; (5) run a pilot survey; (6) carry out the main survey; (7) analyze the data. The length of the survey was evaluated prior to sending the request to participate, as “respondents are more likely to commit to answer a questionnaire when they see it as interesting, of value, short, clearly thought through, and well presented” (Burgess, 2001, p.5).

The anonymous survey included a combination of open-ended and structured questions. A list of questions for the survey appears in Appendix A. Open-ended questions allow respondents to make as few or as many comments as they desire, and to include themes or issues not identified at the start of the study. An example of an open-ended question used in the survey was “How do you feel the implementation of the LEAN process has impacted you personally?” An example of a structured question was, “How would you rate your personal satisfaction in your job since the implementation of the LEAN has begun,” followed by a rating scale. Palys and Atchison (2008) state, “closed or structured questions, in contrast, allow the respondent only a small range of responses...and involve some *presupposition* on the researcher’s part about which aspects of a given issue are important to address” (p. 87). In other words, the researcher, embarking on a study, cannot envision all the possible responses to a particular question. The use of open-ended questions allows the research participant the opportunity to incorporate his or her own thoughts into the survey, resulting in new data not originally anticipated by the researcher.

The second tool employed in the study was a semi-structured interview. On the survey questionnaire, respondents had an opportunity to select a question asking, “Would you be interested in having a semi-structured interview with the researcher to elaborate further on this topic?”

The questions for both the online survey and the semi-structured interview were piloted with a test group of six individuals from within the IHA to determine whether or not the questions and the format were presented in an easy-to-read format. Minor revisions were made to the online to better reflect the questions being posed by the study.

Study Conduct

The online portion of the study allowed participants to log on from a location of their choice and answer the questions. It is not known how many of the invited participants took the opportunity to visit the survey website but then chose not to participate. Respondents who agreed to an interview were given a time and place to meet with the researcher by the third party.

Respondents were also informed that they could opt out of the process at any period up to date of data interpretation. The data gathered from the interviews was used to supplement the data gathered from the survey. Four interviews were conducted. Participants were selected on a first-to-respond basis. The interviews ranged in duration from 15 minutes to almost an hour in length.

Respondents were advised that the transcripts of the voice-recorded interviews would be made available to them if requested for a review of accuracy and completeness. To date, no respondents have requested to view the transcripts.

Data Analysis

Twenty-four participants began the survey, and a total of 21 participants completed all 15 questions. This equates to a 34% response rate, and an 88% completion rate for those who started the survey. The voice recordings of the structured interviews were transcribed by the researcher verbatim.

Due to the qualitative nature of action research, it is important to understand how the collected data is analysed. The data was sorted into subgroups of related themes, ideas, and thoughts. Ryan and Bernard (2003) state “theme identification is one of the most fundamental tasks in qualitative research” (p. 1). Ryan and Bernard (2003) have identified twelve techniques for discovering themes in texts. They are (1) word repetitions; (2) indigenous categories; (3) key words in context; (4) compare and contrast; (5) social science queries; (6) searching for missing information; (7) metaphors and analogies; (8) transitions; (9) connectors; (10) unmarked texts; (11) pawing (proofreading the material and underlining key phrases); and (12) cutting and sorting. The data was reviewed seven times using these techniques to identify patterns and themes. The most useful of the strategies were the word repetition and metaphor and analogy techniques. The words “communication” and “lack of communication” appeared frequently in the data, as well as metaphors likening the staff to “robots” and “children.”

CHAPTER 3

LITERATURE REVIEW/EVIDENCE

While LEAN and many other systems (Six Sigma and DMAIC for example) have existed in manufacturing for many years, there has been only limited research on the implementation of LEAN in a healthcare environment. In order to answer the research question posed in this paper, it was necessary to examine the literature on three specific areas related to the implementation of a LEAN process. These include: change management, The LEAN production system, and recruitment and retention of staff.

Change Management

The implementation of a LEAN process at RIH required change management strategies to mitigate or negate potential human resource issues that may negatively affect the outcome of the project. Jimmieson, Peach, and White (2008) state, “Organizational change management is concerned with facilitating the process of change through modifications of strategies, structures, and process” (p. 247). Change management is much like a check and balance system, which allows those involved with a significant organizational change the opportunity to plan for the change rather than entering the process in a haphazard or uncoordinated way. In keeping with the axiom “fail to plan, plan to fail,” change management highlights the need for proper planning for change, drawing from educated and experienced history and theory. Grunberg, Moore, Greenberg, and Sikora (2008) believe that change can lead to an improvement in product quality and productivity, but can also conversely lead to lower morale and commitment among a workforce in the absence of good communication and planning. The goal for the leader charged with implementing change is to find the median or point of equilibrium in order to make the change a success. Guowei (2007) states that this requires a leader who “intentionally takes

actions and creates interventions through a deliberate process with the goal of achieving a different state of behaviour, structure, and/or conditions” (Guowei, p.7).

There are many reasons why change initiatives fail, but “employee resistance,” state Avery, Wernsing, and Luthans (2008), “is a primary obstacle for effective organizational change processes” (p. 53). The task for leaders, according to the authors, is to recognize the importance of the employees’ commitment to change (Avery, Wernsing, & Luthans, 2008). Without buy-in from a significant number of the affected employees, no change will be as successful as hoped for by the organization’s leadership. Jimmieson, Peach, and White (2008) state that “readiness for change is an attitude that acts as a precursor to intentions to support change” (p. 51) Another potential pitfall which occurs during periods of change is that “traditional managerial focus on episodic change overlooks how employees (including middle management) reconstitute the meaning and practice of organizational change” (Guowei, 2007, p. 7).

Guowei (2007) proposes that there are three themes or primary reasons why change initiatives fail. The primary reason for failure is secrecy. Management must be open and clear with the employees affected by the change. This openness should include frank discussion, including the reasons or drivers for the change. The second cause for failure, states Guowei (2007) is betrayal. The change should not come as a surprise to the employees. For instance, a CEO quoted by media that “our organization would never entertain a change of that magnitude without input from staff,” only to then authorize a change without consultation will not be viewed as trustworthy. Such deeds are not forgotten quickly by staff. The third theme Guowei (2007) describes is unfairness. Regardless of the justification for the change, it must be viewed by employees as fair and just. For example, should cost-saving be required, the cuts should be spread out over an entire department and not a select few (Guowei, 2007).

Once a change initiative has begun, rumours and speculation regarding the initiative begin to appear. Typically, rumours are a product of collective sense-making (Bordia, Jones, Gallois, Callan, & Difonzo, 2006). Rumours help the collective (employees in most cases) make sense of a situation that is generally out of their hands or sphere of influence. Rumours can be about a range of phenomena but “are typically about issues of considerable importance to people i.e. personal safety or livelihood” (Bordia, et al., 2006, p. 602) . Bordia et al. (2006) also suggest that rumours may be a result of stressful circumstances, and are the end product of people attempting to regain control of their lives. Rumours can doom a project to failure if they are not addressed in a timely and efficient manner. Nature abhors a vacuum, and as such, rumours are often created to fill this void.

For as many reasons a change initiative can fail, there are as many strategies that can be employed to assist in the success of a change initiative. The most important contribution to a successful change is to have input from the employees who will be affected by the change. Schraeder, Swamidass, and Morrison (2006) state, “Allowing employees to participate in making decisions related to a change initiative is paramount in the successful adoption of the change” (p. 35). Providing opportunities for employee input will help employees to retain a sense of ownership or inclusion in the decision making process. Employees may also “recognize the practice limitations of change goals in a given context that are not obvious to senior managers in an organization” (Rafferty & Simons, 2006, p. 32). In doing so, employees can provide valuable information and feedback from their own areas of expertise.

Jimmieson, Peach, and White (2008) postulate that three factors will assist in the success of change. The first factor is a favourable and positive view regarding the need for change. Second, existing social networks must be capitalized upon. Leaders within these social networks

must be identified and given additional information to relay back to their peers. Third, a perception of control is very important to employees. Regardless of how the decisions relating to the change initiative are formed, an “illusion of inclusion” must be created to solidify the perception of control. The outcome of the change is the constant, the path taken will fluctuate. “Although paradoxical,” states Guowei (2007), “indeterminacy is the nature of planned organizational change” (p. 13). There are very few cases where the predicted outcome of a system change is what actually occurs. Change is fluid and dynamic, and is subject to deviation depending upon a myriad of possible solutions to emerging issues.

The study of change management provides the authors of change an opportunity to review academic literature to determine the best course of action to facilitate a smooth and successful change process. The central theme found in the literature is that change initiatives that are undertaken without input from employees are very seldom successful, and create a divide between management and employees.

The LEAN Production System

What is Lean?

Academics have struggled for many years to develop a standard definition of LEAN. In its simplest and most rudimentary form, LEAN is the reduction and abolishment of waste, in any given process. The term LEAN was coined by Womak, Jones, and Roos (1990) during their study of the Toyota Production Model. Contrary to popular perception, LEAN is not an acronym. It is meant to envision a LEAN operation with little or no fat.

The seven areas of potential waste focused on during the implementation of a LEAN process are; “Inventory, Overproduction, Waiting, Transportation, Defects, Excess Motion, and

Processing” (Blecker-Shelly, 2008, p. 120). These wastes are considered superfluous to the efficient operation of a given plant, department, or ward.

However, it is important to differentiate between LEAN theory and LEAN production. LEAN production can be viewed as “an integrated socio-technical system whose main objective is to eliminate waste by concurrently reducing or minimizing supplier, customer, and internal variability” (Scherrer-Rathje, Boyle, & Deflorin, 2009, p. 80). LEAN as a theory considers the interrelationship and synergistic effect of practices such as kaizen, six-sigma quality, and kanban to improve overall levels of productivity and product quality within a workplace (Scherrer-Rathje, Boyle, and Deflorin, 2009).

LEAN in Healthcare

The challenge with promoting LEAN thinking in healthcare is “to make staff members aware, and gain their approval, of its potential benefits” for the workplace (Aherne, 2007, p. 14). Healthcare, as an industry, has traditionally not been held accountable for the amount of waste in the system. This may be due to the fragmentation of healthcare delivery typically found within Canada, or perhaps due to a lack of urgency on the part of administrators to find cost-saving measures. This waste typically takes the form of one or more of the seven kinds of waste mentioned above.

While healthcare has not adopted LEAN thinking as quickly as manufacturing and other industries, it is now apparent that some type of waste control process must be used within healthcare systems. Healthcare spending in British Columbia has increased by more than six billion dollars since the 2000-2001 budget year (Government of British Columbia, 2009, Innovations in Healthcare section, ¶1). In order to prevent costs from rising and forcing other areas of the provincial social services framework to decrease spending to subsidize the

healthcare portfolio, savings must be found within current operations. Similarly, in the UK, as the costs of healthcare continue to escalate “the National Health Service (NHS) is put under increasing pressure to reduce costs, while improving patient safety and care, and reducing errors and the resulting litigation” (Aherne, 2007, p. 15).

The impending mass retirement of many of the baby boom generation is another reason why LEAN processes should be studied within healthcare. The Government of British Columbia (2002) predicted, “The number of 55 to 64 year-olds is about to take off as baby boomers enter this age group. At the same time, the number of 15 to 24 year-olds will remain fairly flat” (p. 24). Recruiting replacements for these retiring baby boomers will be a daunting, if not unattainable, task. In order to maintain present levels of staffing, LEAN processes must be established to ease the burden on a diminishing workforce by allowing healthcare workers to work on eliminating, or at least decreasing, the seven forms of waste identified by LEAN proponents. In the LEAN process studied for this project, the goal of the project is not to reduce the workforce but to give the employees tools to better manage the tasks at hand. A “no lay-off” policy is in place for any positions not required at the completion of the process. Employees are guaranteed to have employment within the facility in some capacity. This provision has helped build trust between the employee and the employer, and has allowed for the free flow of ideas and discussion between the two groups.

LEAN is a good “fit” for healthcare for a variety of reasons. The concepts and tools are simple and agile, and require little fine-tuning between different departments or facilities. LEAN can also be applied at the frontline, where staff often feel they lack the power to make changes in their areas of work (Staus, 2008). Healthcare bureaucracies are “by nature slow and sluggish beasts. Suggest a change in the system and it could take months or more to make it happen

(O'Brian, 2009, p. A6). LEAN addresses this concern by providing quick and efficient solutions to problems.

The literature relating to LEAN in healthcare is sparse, as it has been only since the late 1990s that LEAN has begun to make inroads into healthcare. In the United States, Virginia Mason Medical centre in Washington has made LEAN a part of its culture and is a true success story. LEAN permeates most aspects of the organization. According to O'Brian (2009), "The hospital began implementing LEAN strategies in 2002 and within three years it had saved more than \$8 million US in capital expenses" (p. A6).

Recruitment and Retention

In this era of a shrinking healthcare workforce and fierce competition for skilled and technical workers, recruitment and retention of employees plays a vital role in all organizations. This is particularly true in healthcare, where the ability to recruit and retain is hampered by collective agreement language and a wide variety of options for employees. In the U.S., it is projected that by 2020 there will be a 20% shortage of registered nurses, and that the increased opportunities for nurses to work in private industry will compound this shortage (American Hospital Association (AHA), 2004).

The cost to replace a staff member in a hard-to-fill position can reach as high as 150% of the annual salary of the position (Capko, 2007). It is evident then, from a financial viewpoint, that a very important piece of the recruitment and retention puzzle is to keep the employee in the workplace, and to make the workplace more efficient and to improve working conditions by using innovations such as LEAN to maintain the infrastructure of healthcare while using fewer people to do it.

A ground-breaking study on why healthcare employees consider leaving their employer was conducted in the UK by Fleming and Taylor (2006). The study found three main reasons why employees consider leaving healthcare employers (ranked in importance). The first reason was unsociable hours. Healthcare is a 24 hours- a- day, seven-day- a- week operation. Many staff begin to feel the strain of working unsociable hours after being in the industry for a number of years. The second, and perhaps most damning reason identified, was lack of management support. Poor support issues range from a lack of regular daily supervision to lack of support in times of crisis. The third issue identified by Fleming and Taylor (2006) was workload. The workload in healthcare appears to be increasing every year. More complicated patient-health problems result in more diverse and time consuming tests to determine the patients' issues. The need to streamline these tests by investigating the steps required to perform the procedures is evident. In the future, healthcare will continue to struggle with workload and retention issues, and will continue to have to provide more services with less staff.

Conclusion

The three topics reviewed in this section: change management, LEAN, and recruitment and retention, are all important pieces required for the successful implementation of a LEAN process in a healthcare environment. Each piece must be viewed as a separate entity, but also as a segment of the whole. The recruitment and retention issues faced in healthcare, rather than fiscal issues, may be the catalyst required to drive the LEAN theory in the future.

The literature speaks to what the future of healthcare may be. Staff shortages, particularly in clinical positions, will require that all employees find ways to "do more with less." LEAN has the ability to streamline the flow of information and processes thereby eliminating waste and duplication of services.

CHAPTER 4

RESULTS

The data, both quantitative and qualitative, provided some answers to the research questions posed in this study. The implications of the findings for the study are discussed below.

Question One: Human Resource Implications

Using the data as a guide, there are several human resource implications arising out of the LEAN implementation. First is the issue of retirement: Table 3 in Appendix B shows that 21.7% of respondents have changed their retirement plans due to the LEAN implementation and 17.4% are undecided. Extrapolating to the number of staff working in the department, this could potentially result in a loss to the organization of up to 27 staff members. When viewed in conjunction with Table 2 in Appendix B, the results are more disturbing. The majority of survey respondents (37.5%) have been employed between 11-25 years and a slightly smaller percentage (29.2%) have been employed for more than 25 years. The knowledge and experience possessed by these individuals would be sorely missed if they retired en masse.

Second, the negative effect of the LEAN process on the morale of the department is evident, judging on the number of comments submitted through the online survey, and offered in the semi-structured interviews. Many staff felt that the morale and atmosphere in the department had declined since the start of the LEAN implementation. The ability of the department to recruit new staff may be affected if this trend is not reversed in the future.

Roy, Henson, and Lavoie (1996) define a skill shortage from an economist's point of view as occurring when the "quantity of a given skill supplied by the workforce and the quantity demanded by employers diverge at the existing market conditions (Roy, Henson, & Lavoie, 1996, p. 11). This can include both "quantitative" shortages, in which there is a lack of potential

workers with particular skills, or “qualitative” shortages in which current workers in an occupation lack the skills required by employers in a changing environment. Given that the tasks performed by the staff at RIH are of a technical nature, the shortage of staff predicted in the future will fall under both the qualitative and quantitative shortages identified by the authors.

Question Two: Impact of LEAN on Job Satisfaction

Job satisfaction is difficult to measure. Job satisfaction tends to ebb and flow based on political and personal climates in the workplace. Table 3 in Appendix B shows a dramatic decrease in job satisfaction. Given that the study was conducted during the early stages of the implementation, this high figure may be a form of “push back” against the organization. While no exact measure of job satisfaction was defined for this study, it can generally be described as a feeling of accomplishment while at work, and a sense of enjoyment while performing work-related tasks.

It is evident from the data that the LEAN initiative has significantly affected employees’ job satisfaction since its roll out. While it is not clear what the ramifications of this may be, past experience demonstrates a link between job satisfaction and employee absenteeism. Keon and McDonald (1982) state that job and life satisfaction are jointly determined. In this regard, if an employee is dissatisfied with their work environment it is highly likely that they will be unhappy in their private or home life as well. This may lead to increased absenteeism and a host of other issues in the workplace.

Question Three: Change Management Leadership

Chapter 3 examined what the research literature says about change management. Change management is not about selling an idea but rather selling, or demonstrating to sceptics, what the change can do to make their lives less complicated. Leadership strategies often co-exist with

change management theory in a matrix. Each discipline borrows heavily from the other to reach the desired end result. The data, in this project, demonstrates that this intertwining of the ideas did occur, but at a very limited level. In Chapter 2, the theories of Grunberg, et al. (2008) were examined. Their observation that change can lead to lower morale and commitment without good communication and planning was evident in the responses from some of the participants.

In Chapter 3, the work of Jimmieson, Peach, and White (2008) was also examined with respect to their description of three factors that assist in the success of change. The factors described included a favourable need for change, capitalization of social networks, and a perception of control. In this study of the LEAN implementation, it is clear that the architects of the change have attempted to weave these principals into the initiative, but with limited results. Many respondents felt a sense of helplessness, and expressed the belief that the employees selected to represent them during the change process were not selected for their skills, but due to their brief tenure in the department. Wheatley (2006) infers that if a system does not participate in or acknowledge change, it will be rejected.

When asked in the online survey whether or not LEAN was an emerging technology that should be exploited to improve service, the response was an overwhelming no. Given that the same staff responded that they felt that they had received adequate information on what LEAN is, it is possible that the link between theory and practice was not firmly established. This lack of understanding was also demonstrated in the inability of most respondents to draw connections between overtime shifts and staffing issues, and the way in which work processes are completed. In essence, the number of staff needed to complete the tasks required are not available, even at premium rates, and as a result the staff feel an “obligation” to accept overtime work.

CHAPTER 5
LESSONS LEARNED/IMPLICATIONS FOR HEALTH
LEADERSHIP/GENERALIZABILITY AND TRANSFERABILITY/KNOWLEDGE
TRANSLATION

In retrospect, many lessons were learned during the initial study and in the years preceding. Research of any type is a very onerous proposition that commands a great deal of attention to detail and thoughtfulness and should not be entered into lightly.

The participants in this study were some of the first to undergo a “LEAN Transformation” as it was being called within the Interior Health Authority. Appendix B contains many of the personal comments as well as the data that demonstrates that any undertaking which does not take into consideration the human resource component prior to beginning will have some very high mountains to climb. Fail to plan, plan to fail.

When change management techniques are applied at the commencement of such an undertaking as discussed here the outcomes can be very different. The success or failure of any project depends in part to the amount of time given to understanding what the desired change is.

The methods discussed in this work are transferable to many areas other than healthcare. The important concept to remember is the difference between LEAN theory and LEAN productivity as discussed in Chapter 3. Healthcare should rely on the theory of LEAN in parallel with other tools such as six-sigma, etc. to reduce waste and increase productivity.

LEAN should be viewed from a system-wide or holistic view prior to implementation. LEAN is not a quick fix to apply to a certain department/facility/system but rather a cultural shift that must be implemented with forethought and an appreciation of the tools required for a significant cultural shift.

The ability to transfer knowledge regarding LEAN methodology has increased greatly in the past number of years. A simple search for “LEAN consultants” will garner many hits in most metropolitan cities. However, it is vitally important to remember that LEAN methodology versus a cultural shift to embracing a LEAN culture are two very distinct and separate entities. Cultural change is the most important part of a successful LEAN implementation.

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Author Note – Special Circumstances □ This manuscript is a condensed version of and is based on data used in the author's masters thesis. □ Pugh, M. (2009). THE LEAN EXPERIENCE IN HEALTHCARE: THE HUMAN SIDE; LABORATORY SERVICES AT ROYAL INLAND HOSPITAL, KAMLOOPS, BRITISH COLUMBIA.

APPENDIX A

Demographics

1. What is your primary role in the Royal Inland Hospital (RIH) Laboratory?
 - a. Clerk
 - b. Lab Assistant
 - c. Other
2. How long have you worked in the Lab at RIH?
 - a. Less than 2 years
 - b. 2-5 years
 - c. 6-10 years
 - d. 11-25 years
 - e. more than 25 years

Job Satisfaction

3. How would you rate your personal satisfaction in regards to your job?
 - a. Very Satisfied
 - b. Somewhat Satisfied
 - c. Satisfied
 - d. Occasionally Satisfied
 - e. Not Satisfied
4. How would you rate your personal satisfaction in your job since the implementation of the LEAN process has begun?
 - a. Very Satisfied
 - b. Somewhat Satisfied

- c. Satisfied
- d. Occasionally Satisfied
- e. Not Satisfied

5. Do you plan to retire in the next 5 years?

- a. Yes
- b. No
- c. Undecided

6. Has the implementation of the LEAN process changed/influenced your retirement plans?

- a. Yes
- b. No
- c. Undecided
- d. N/A

7. Would you recommend the RIH Lab as a good place to work to others and why?

- a. Yes
- b. No
- c. Undecided

8. How has the implementation of the LEAN process affected you personally?

Response:

Implementation

9. How do you feel about the implementation of the LEAN process in the RIH Lab?

- a. Positive experience
- b. Negative Experience
- c. Unsure

10. What, if anything, in your opinion could have been done differently during the implementation?

Response:

11. Were the reasons for implementing the LEAN process explained to you?

a. Yes

b. No

c. Undecided/No Response

12. Do you feel you have a solid understanding of LEAN theory?

a. Yes

b. No

c. Undecided/No Response

13. One of the strategic objectives of the Interior Health Authority (IHA) is to “effectively exploit available and emerging technology to improve diagnostic and treatment services”. Do you feel the LEAN process falls into this objective?

a. Yes

b. No

c. Undecided/No Response

14. If you answered Yes or No please provide some insight.

Response:

Interview

15. Would you be willing to participate in an interview with the researcher to further discuss your thoughts and feeling surrounding the LEAN implementation? If so, please contact the third party who sent you the invitation to participate in this survey.

16. Please feel free to add any comments you feel may be important.

Response:

APPENDIX B

Appendix B is a repository for the research that took place for this project. It is segmented into four main sections: On-Line Survey, Semi-Structured Interviews, Study Conclusions, and Scope and Limitations of the Research. Selected, representative responses from respondents are included in the On-Line survey section. The two types of data collection were conducted over a 1 month time frame. Participation in the on-line survey was limited to a 29 day period due to project time constraints. Interviews were conducted over a 3 day period in Royal Inland Hospital.

On-Line Survey

The response rate for the on-line survey exceeded the expectations of the researcher. A total of 70 invitations were sent to employees in the department affected by the LEAN implementation. The return rate for the survey was 24 individuals, or 34%. The survey questions were a mixture of open ended and closed response varieties. The final question in the survey invited the respondents to impart any final comments they had regarding the LEAN implementation, or any other related issues.

Demographics

Questions 1 and 2 of the on-line survey dealt with the demographics of the respondents. Question 1 “What is your primary role in the royal Inland Hospital (RIH) Laboratory,” and Question 2 “How long have you worked in the Lab at RIH” yielded the following responses.

Table 1

Distribution of Responses by Role

Role	Response %
Clerk	4.2%
Lab Assistant	4.2%
Other	91.7%

Table 2

Distribution of Responses by Length of Service

Years of service	Response %
< 2 years	8.3%
2-5 years	4.2%
6-10 years	12.5%
11-25 years	37.5 %
> 25 years	29.2 %

The results show a very important trend: Respondents tended to be from one of the more senior group, with between 11-25 years of employment. This group was followed closely by those employees with more than 25 years of service. The Other group in the survey were Laboratory Technicians. This oversight was unfortunate but did not skew the results. This preponderance of more senior employees may have influenced the types of responses provided in the open ended questions, as many the respondents have operated under a guiding set of

protocols for more than a quarter of a century . LEAN has come to “overturn the apple cart” and re-examine ways of performing everyday tasks associated with the department. Because the responses weighted towards more senior employees, they are likely to illustrate a more conservative reaction to the LEAN initiative. Future research should include a comparison between older and younger workers in an effort to determine whether different or modified versions of change management techniques should be used based on the age of the worker groups.

Due to privacy policies within the organization, data indicating the age, length of service, or any other identifier was not made available to the researcher for this project. As a result, it is not possible to determine a baseline age or experience level for the potential respondents to the survey.

Job Satisfaction

The Job Satisfaction section of the survey contained seven questions. Five of these questions were of a closed variety. Question Eight was open ended and asked, “How has the implementation of the LEAN process affected you personally?”

Table 3

Job Satisfaction

	Very satisfied	Somewhat satisfied	Satisfied	Occasionally satisfied	Not satisfied
How would you rate your personal satisfaction in regards to your job?	8.7%	39.1%	13.0%	34.8%	4.3%

How would you rate your personal satisfaction in your job since the implementation of the LEAN process?	0.0%	26.1%	4.3%	26.1%	43.5%
% Change from pre to post-LEAN implementation	100%	33%	67%	25%	91%

Table 3 shows a decrease in personal satisfaction since the implementation of the LEAN project. The amounts vary from a decrease of 100 % in the Very Satisfied category to 92% increase in the Not Satisfied category. As mentioned earlier, this dramatic drop in satisfaction may be attributed to two factors: the age and length of service of the majority of the respondents, and the timing of the survey. Due to time limitations for the collection of data, the survey was taken reasonably early in the LEAN process, which may have skewed some staff if the process was not fully understood by all involved.

Table 4

Staff Satisfaction

Survey Response Question	Yes	No	Undecided	N/A
Would you recommend the RIH Lab as good place to work and why?	39.1%	39.1%	21.7%	--

Some of the free text responses from the staff satisfaction portion of the survey include, “an improvement in the working conditions once LEAN has been fully implemented” (S4) and “Great place to live, good people to work with and I see LEAN as being a very positive change to the work environment. As a new grad it will be easier to keep skills current in multiple areas as opposed to the current/past where new grads were encouraged to pick a single department to work in. (S6)”

It appears from the preceding responses that there are some employees who have embraced the LEAN process. In the first response, the respondent mentions that he or she is a new grad, supporting the theory that the older, more established workers may view LEAN as a threat to the traditional work environment, while more recent employees may be more able to see the benefits of adopting a LEAN philosophy.

Some participants expressed concerns that LEAN was having a negative impact on morale. One respondent, for example, believed:

Laboratory technology is fast becoming a “push the buttons career.” Expertise in a certain area is becoming meaningless. There is no room for growth or advancement. This has had a grave affect on moral (sp) which will only worsen as experienced techs get fed up and retire early” (S3).

Another observed, “It was an excellent place to work when I started. Due to cutbacks and staff shortages over the past years, job satisfaction has dropped significantly” (S11). Another respondent similarly remarked, “Rumours were abundant before - now they are rampant with

staff morale declining even more, but I do hope when this process is complete there is marked improved in all categories because change of some sort was sorely needed” (S8).

These responses illustrate frustrations with the work environment in the Laboratory. The responses suggest that respondents are disillusioned not only with their own careers, but with the lack of opportunities for advancement within the department.

Implementation

This section of the on-line survey dealt with the effects of the implementation of the LEAN process, and asked respondents for their thoughts on how, if it were possible, the implementation process could have been done differently, or how a different outcome might have been achieved.

5 questions were posed to respondents in this section. Three questions were closed, offering Yes, No, or Undecided responses, and two questions used an open ended structure to encourage respondents to delve in the questions.

Table 5

Responses to Implementation of LEAN

Survey Question	Yes	No	Undecided
Were the reasons for implementing the LEAN process explained to you?	69.6%	17.4%	13.0%
Do you feel you have a solid understanding of LEAN theory?	56.5%	26.1%	17.4%
One of the strategic objectives of the Interior Health Authority			

(IHA) is to “effectively exploit available and emerging technology

to improve diagnostic and treatment services.” Do you feel the

LEAN process falls into this objective?

21.7% 60.9% 17.4%

The results of the implementation questions reveal a number of things. First, the respondents generally felt that they had been given sufficient explanation of the reasons for the implementation of the LEAN process and, to a lesser extent, that they had a solid understanding of LEAN theory. The responses in the open questions did not, however demonstrate the same feelings.

“Management should have been more up-front about decisions that had already been made before the project began, and should have welcomed suggestions to make the implementation easier” (S3).

“I don’t know. I think people feel that the choices were (and have been) made before LEAN was even implemented” (S22).

“The motives and ideas for change should have been shared with staff from the beginning. Team members with knowledge and leadership skills should have been chosen to lend the entire process some credibility” (S14).

“Instead of using addition money to hire more staff, we are being pushed to maximize an already efficient staff even more” (S8).

“The word ‘exploit’ says it all. If I had wanted to work on an assembly line, I’d already be working somewhere like Toyota. Or a private lab” (S17).

“IHA is in no way concerned with staff in-put, or using and maintaining staff expertise. They are concerned with having enough "warm bodies" in front of their analyzers to give the fastest turn around time possible” (S17).

With respect to the question asking whether or not staff, individually, viewed LEAN as emerging technology, the answer was an emphatic no. The responses in the open questions also corroborate the closed survey questions. The view that LEAN was a “flavour of the month” management tool, rather than a new way of thinking about process, was very evident:

Respondents’ Final Thoughts

The 15th and final question in the on-line survey was an open-ended question that allowed respondents an opportunity to provide any final thoughts they may have wished to share. The final thought question garnered eleven responses. The majority of the responses dealt with unwillingness of more established workers to fully embrace the LEAN process, and to see it as a way to mitigate some of the labour and staff retention issues currently experienced by the department:

“I believe that this project will fail as it offers nothing to increase job satisfaction. I see staff retention as a huge problem” (S24).

“I feel that this lab has such a bad moral (sp) that the staff looks at all change in a negative way. I am not sure what the solution is to this problem. Hopefully the LEAN

project will be implemented in a positive way and will help the staff feel that they are valued employees” (S7).

“I am a younger employee and not afraid of change. I see LEAN as the only way we as a lab can access any funds to make improvements. LEAN as a system is not wrong, treating it as the Savior of all is” (S6).

“Some of the techs are close to retirement and do not wish to cross train nor do they feel the time and stress would be worth it to study and retrain to be competent in another department so close to retirement. I have heard some people say that they will just leave early. Some of these people have only worked in one dept for 30years and it would be too much to ask them to retrain for another department. I have also heard rumors that the techs will all have to rotate through nights. This is causing a lot of added stress as well. We seem to all be in the dark as to what the actual plans are until they are implemented. The moral is extremely poor here. Not a nice place to come every day to work” (S20).

Semi-Structured Interviews

A total of four semi-structured interviews were conducted during the research phase of this project. Candidates were selected on a first come basis in order of the responses sent to the third party who sent out the email invitations. The total number of responses for interviews was three, with an additional interviewee contacting the researcher directly while on site.

The interviews were conducted in a private room adjacent to the RIH Laboratory. Subjects were given a copy of the questions and an informed consent, which was reviewed and

then signed by both researcher and subject. For ease of thematizing the data, the interviews were recorded and transcribed by the researcher. The interviews were scheduled for thirty minutes, and subjects were advised of time limitations. With the exception of one interview, all meetings were concluded within the time frame provided.

Themes

Three main themes were identified from the interviews; Communication, Trust, and Work/Life Balance. There were many different views on the same topic, depending on the respondent. Each respondent held differing views on why LEAN initiative had been introduced, ranging from budget cuts to a lack of a labour pool to draw from.

Communication was one of the central themes of the interviews, and respondents saw either a lack or an abundance of it. Three respondents talked at length about a perceived “secret agenda,” or the fact that the LEAN project outcomes, in the form of a core laboratory, had been decided to prior to the start of the project.

The manner of communication was also a matter of concern for some of the respondents. Many felt that they were being spoken to like a child, and that important LEAN theories were not explained to their satisfaction.

“Why must they treat me like I’m a Grade One child? I am an adult and am capable of understanding these concepts if they were presented to me in an adult manner” (I2).

“I don’t like all these terms they keep throwing out. Plain English works best” (I2).

“My mornings are busy enough without having to listen about LEAN for thirty minutes” (I4).

“Why are they telling us what we need to know?” (I3).

Trust was the second theme identified in the interviews. The need for trust between management and employees is paramount to the effective operation of a department. The majority of respondents spoke of long held trust issues with both the hospital and the larger Health Authority as whole. For example, several interviewees brought up their suspicions that the LEAN initiative was nothing more than an exercise to prepare the laboratory for privatization or cutbacks.

Onsite management were seen as supportive of staff, and understanding of the massive shifts the LEAN project had demanded of their work life. They felt that the onsite manager was forthright and honest in her comments regarding the LEAN process, and was also available to comfort them in times of emotional crises.

Once again, the issue of whether or not final outcomes for the project had been pre-determined were raised. Respondents proposed the idea that the need of the Health Authority was to find a mechanism to implement a “core lab,” and that LEAN was simply a means to implement this desire:

“The outcome is pre-determined. Why not just tell us that a core lab is what they want?”
(I3).

“First they take 15 percent off my pay. Now this. What next?” (I2).

“Once again we (front line workers) are being cut to pay for management” (I1).

Work/life balance was the third theme identified, and was mentioned numerous times in the interviews. The respondents reflected on the amount of overtime they are working, as well as the number of shifts which were left unfilled due to a lack of staff. This resulted in the need to work faster while at the worksite in order to maintain current service levels. Compounding the problem, workers lacked adequate time to rest and rejuvenate between regularly scheduled shifts.

Reference was made several times to the difference between public and private laboratories, and to the disparities between the higher output expectations of private industry labs and those of labs in publicly funded settings. The greater output was seen as a negative, and was seen as unattainable in a public setting.

A recurring theme identified within the work/life balance realm was that of overtime. Staff felt pressured to work overtime shifts in order to provide service to patients:

“I feel bad if I turn down overtime because the work won’t get done” (I4).

“I took a part time position because I don’t want to work full time. The pressures to work overtime shifts from my peers means I’m here more than I want to be” (I3).

“If LEAN doesn’t make me retire early, the overtime will” (I3).

An interesting result was that staff did not draw connections between the LEAN project and its objective of reducing steps and reducing workloads, thereby potentially decreasing the amount of overtime staff would be asked to do. This loop could have been better communicated to staff to decrease some of the anxiety they were experiencing.

APPENDIX C

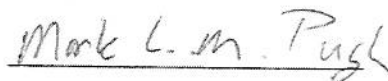
1. How long have you worked in the laboratory at Royal Inland Hospital?
2. In what capacity?
3. Have you worked in other laboratories besides RIH? If so, where and how long?
4. Have you been involved with the LEAN implementation in the laboratory? If so, in what capacity?
5. How has the LEAN implementation affected you personally?
6. What are your thoughts/opinions in regards to the way in which the process was implemented?
7. Do you feel you were adequately briefed as to what the LEAN process involves? If not, what could have been done differently?
8. What do you think is the driver behind the LEAN process?
9. Has the implementation of this process changed you retirement plans? If so, how?
10. Have you noticed a change in the morale of yourself and fellow staff? Explain.
11. Do you feel that the laboratory is as good place to work? Has that changed since the implementation of the LEAN process? Explain.
12. What would you have done differently if you were in charge of this project?
13. Do you have anything you would like to share with me that hasn't been reviewed during this interview?

APPENDIX D

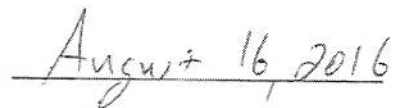
This manuscript is my own work. As a member of the Canadian College of Health Leaders (College), I have adhered to the College's *Code of Ethics* as required. Any assistance I had in manuscript preparation was ancillary and within the limits defined by the *Fellowship Program Requirements and Guidelines*.

A handwritten signature in black ink, appearing to read 'Mark L. M. Pugh', written over a horizontal line.

Signature

The name 'Mark L. M. Pugh' written in black ink over a horizontal line.

Name

The date 'August 16, 2016' written in black ink over a horizontal line.

Date