Exploring Implementation of Quality Improvement Initiatives in Healthcare: A Qualitative Case Study

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Abstract

Effective implementation of quality improvement (QI) initiatives is associated with enhanced clinical outcomes, increased patient and provider satisfaction, and reduced length of hospital stay. However resources and effort invested in the QI initiatives do not always meet clinical or patient expectations. As a prerequisite for changing this situation the aims of this qualitative study were to examine: (a) the process underlying implementation of QI initiatives in the emergency department (ED); and, (b) the use of an implementation audit checklist to improve performance. This qualitative exploratory study was conducted over a four-week period. Purposive intensity sampling was employed to recruit six ED healthcare providers who were: (a) a male or female ED registered nurse or ED physician; and, (b) involved with designing, planning and implementing QI initiatives in the ED. Numerical and free text data were collected from six implementation audit checklists. Data were also collected from six face-to-face interviews. Findings are consistent with previous studies. Critical features of effective implementation are: prioritization of initiatives; diligence in planning; staff and leadership engagement; on-going evaluation; collaborative teamwork; and, resources. The implementation audit checklist consisting of step-by-step guidelines, definition of capacity and resource allocation is perceived as a promising intervention tool for use by multidisciplinary healthcare professionals. This checklist, a facilitator for transferring implementation theory into operational and clinical practice, has potential to improve emergency department performance.

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On a personal note, every step of my journey through graduate studies has been helped by my lifelong partner – John – who changed role from fiancé to husband near the completion of my graduate career. Without you, the long study days would have been much longer and the occasional breakdown in brain synaptic activity considerably more stressful.

Dedication

This thesis is dedicated to Dorothy Madden

Chapter One: Introduction

The release of the report - To Err is Human: Building a Safer Health System – acted as a catalyst for healthcare reform in North America (Institute of Medicine, 2000). The Institute reported that thousands of preventable deaths occurred every year in US healthcare facilities because of medical errors. A medical error was defined as the failure to complete a planned action as intended or the use of a wrong plan to achieve an aim (Reason, 1995). Deaths arising from medical errors are not limited to the US health system. A series of tragic adverse events in emergency departments in Western Canada resulted in a public outcry at the quality of emergency care services (Winnipeg Regional Health Authority, 2004; Shepherd, 2005). Since the release of the US and Canadian reports, the quality movement in North America has gained momentum in raising awareness and encouraging quality improvement (QI) initiatives as well as identifying the need for a system-based approach to affect quality (Berwick, 2001). As a result, emphasis has shifted away from quality being the sole responsibility of the frontline practitioner to shared accountability within the system (Canadian Patient Safety Institute, 2002). This perspective was consistent with Reason (2000) who identified that when an adverse event occurred, the important issue was not who made the error but how and why the event occurred.

The systems approach begins at the national level where integration, standardization and regulation of healthcare quality in Canada occur. The Canadian Patient Safety Institute (2002), Canadian Council of Health Service Executives (2004), and Canadian Council on Health Services Accreditation (2007) are advisory and/or regulatory organizations established to facilitate these national level activities relating to healthcare quality. In Western Canada at the provincial and organizational levels, quality improvement and patient safety have become strategic priorities in order to deliver improved quality of care as well as increase public confidence in the healthcare system (VIHA, 2008). This strategic shift has resulted in increased investment in enabling the development and implementation of evidence-based QI initiatives that meet the expectations of regulatory bodies and patients' needs and expectations. Evidence

of renewed focus and increased investment is seen at a number of levels in the healthcare system, e.g., adverse event reporting systems (Baker et al., 2004), leadership rounds (Budrevics & O'Neill, 2005), Canadian triage assessment scores (Jimenez et al., 2003), patient streaming (O'Brien, Williams, Blondell, & Jelinek, 2006) and standardization of clinical pathways (Patel, Elpern, & Balk, 2007; Trzeciak et al., 2006; Gao, Melody, Daniels, Giles, & Fox, 2005). Furthermore, frontline providers are reported to be benefiting from participation in collaboratives which have emerged as a bottom-up mechanism to engage healthcare providers in quality improvement in wards and departments (Øvretveit, et al., 2002; Bartlett, Cameron, & Cisera, 2002). Benefits of evidence-based QI initiatives have been reported including: positive clinical outcomes (Dellinger et al., 2004; Shojania, Wald, & Gross, 2002; Angus et al., 2001), improved patient satisfaction (Larson, Nelson, Gustafson, & Batalden, 1996), reduction in process variation and healthcare costs (Shortell et al., 2000), reduction in patients' anxiety (Mosher et al., 1992) and improved provider satisfaction (Zangaro & Soeken, 2007).

However, despite these encouraging studies there is sufficient evidence in the literature to suggest that Canadian and US healthcare systems have not yet found the ideal prescription for sustained improved quality of care. In a study examining the implementation of QI initiatives to improve work design in Canadian and US healthcare systems, healthcare executives indicated that improvement efforts were barely to moderately successful in accomplishing desired objectives (Ho, Chan, & Kidwell, 1999). Some researchers have reported that less than 50% of healthcare improvement initiatives were successful (Baer & Frese, 2003; Repenning & Sterman, 2002) while others revealed an even more pessimistic view of QI efforts. Alemi, Safaie, and Neuhauser (2001) reported that only 20-40% of all improvement efforts in healthcare were successful and Jarlier and Charvet-Protat (2000) simply reported that the majority of initiatives were failures. The impact of ineffective implementation is a bitter pill to swallow and at times, has tragic consequences. Reports from the Governments of Manitoba (Manitoba Department of Health, 2005) and British Columbia (Shepherd, 2004) provide testimony to this. In addition to poor clinical

outcomes and patient dissatisfaction there are also organizational costs, including wasted time and human resources as well as reduced organizational willingness to embrace future change initiatives (Teasdale, 2009).

There are two possible explanations for a QI initiative failing to meet expectations. First, the initiative was not the correct 'fix' for the issue. However, there are data to suggest that this path of deduction, described as a Type III error, may be flawed. In times of failure, it was reported commonplace for implementers to blame the QI initiative when in fact, the delivery mechanism was at fault (Dobson & Cook, 1980). An alternative explanation for failed implementation was proposed by Berwick (2003) who suggested that implementation failure was in part, due to a large amount of scientific knowledge being unused by clinicians. Berwick suggested that consequences of failing to effectively implement evidence-based knowledge included clinical errors, over-utilization of unnecessary interventions and under-utilization of effective care.

While identification of clinical quality indicators and development of national-based clinical standards have advanced significantly (Dellinger et al., 2008), theory and research on the process of implementing evidence-based QI initiatives, and the environment in which implementation occurs has fallen behind. This is in part as a result of clinicians focussing less attention on the process of how to implement than on what to implement (Grimshaw et al., 2004). Grimshaw and colleagues suggested that if quality of healthcare is to be improved so that both patient and clinical expectations are met then the future direction of quality improvement research must examine more closely the process underlying implementation. Two streams of literature examining implementation in healthcare settings have emerged. The first stream related to the role of provider behaviour and implementation effectiveness (Grimshaw et al., 2001) and focussed solely on the responsibilities of individual providers for implementation effectiveness. The second key stream of literature studied the influence of contextual factors from which two lines of enquiry emerged: (a) the role of independent factors on implementation

i.e., education and training (Finney & Corbet, 2007), leadership involvement and support (Antony & Banuelas, 2002) and feedback and monitoring (Lewis et al., 2005); and, (b) the role of implementation frameworks that afforded the opportunity to examine the diversity associated with influencing factors as well as an understanding of the interplay and interdependence between factors (Rogers, 1995, 2003; Klein & Sorra, 1996; Kitson, Harvey, & McCormack, 1998; Stetler, Mittman, & Francis, 2008; Greenhalgh, Robert, MacFarlance, Bate, & Kyriakidou, 2004). A review of this literature revealed a diverse group of enablers and barriers to the implementation process.

Although diversity has brought considerable breadth to this avenue of enquiry, it has raised issues concerning the lack of research on the validity of the frameworks (Morse, 1996). It has also revealed a lack of consensus on which factors were perceived as critical to success. The use of Bayesian statistics to identify critical features of organizational change management (OCM) has provided a framework to addressing both diversity and factor criticality (Molfenter, Gustafson, Kilo, Bhattacharya, & Olsson, 2005). The Bayesian OCM framework developed by Molfenter and colleagues identified predictors of successful implementation in the healthcare setting using probability statistics to address issues with content validity. Findings from this study were consistent with previous research in healthcare (Gustafson et al., 2003; Olsson, Øvretveit, & Kannerlind, 2003) as well as in the education setting (Bosworth, Gingiss, Potthoff, & Roberts-Gray, 1999). Although the generalization of OCM framework research was problematic because of its limited retrospective use, it has contributed important information to the field of implementation research. Furthermore, factors identified as critical to successful implementation were consistent with previous implementation studies.

However, two gaps were identified in the implementation research literature. The first related to whether the critical success factors were relevant through multiple levels of the health system, or simply to the organizational level, where research has focussed to date. The second gap related to research on mechanisms for translating the theoretical knowledge into routine practice, described by Haines,

Kuruvilla, and Borchert (2004) as the need to bridge the gap between implementation knowledge and action. In essence, healthcare providers need a hands-on evidence-based tool to increase the chances of effective QI implementation (Olsson et al., 2003). Therefore the purpose of this study was to explore the process underlying implementation of new QI initiatives in emergency departments in a health region of Western Canada, using the OCM framework as a foundation for exploration. The study also sought to explore the use of an implementation audit checklist as an intervention tool to facilitate the translation of implementation theory into practice.

Chapter Two: Review of Literature

Healthcare is a complex system incorporating goals (clinical quality indicators), services (QI initiatives to meet goals), healthcare providers (to deliver QI initiatives), organizational environments (in which QI initiatives are delivered) and patients (recipients of QI initiatives). While identification of clinical quality indicators and evidence-based content of QI initiatives have advanced significantly (Dellinger et al., 2008), theory and research on the process of implementing initiatives, and the environment in which implementation occurs has fallen behind. This is in part as a result of clinicians focussing less attention on the process of how to implement than on what to implement (Grimshaw et al., 2004). Implementation is defined as a course of action identified by the provider to put into practice an idea, concept or program (Weiner, Lewis, & Linnan, 2008) and implementation effectiveness is described as the consistency and quality of use of the idea, concept or program (Klein & Sorra, 1996). A potential consequence of effective implementation is that the idea, concept or program meets expectations and thus, a degree of effectiveness is achieved (Klein & Sorra, 1996).

I was focussed on implementation in the healthcare setting but, when investigating the implementation literature, it was clear that implementation had been studied across a variety of disciplines. To incorporate other experiences of implementation research beyond that conducted in the healthcare setting was important. Therefore this review of literature includes studies reflecting the multidisciplinary contributions to implementation science. As the literature was broad, focus for the review centered on seminal work in three research areas that examined implementation effectiveness: (1) provider behaviour; (2) influence of independent contextual factors; and, (3) influence of implementation frameworks.

Provider Behaviour

A plethora of studies conducted in the clinical setting have focussed on strategies to change provider behaviour as a means of implementing QI initiatives in the healthcare environment. Professional behaviour has been identified as being critical to quality of healthcare (Grimshaw et al., 2001). It has also been shown to affect adherence to the implementation of clinical guidelines and protocols (Grimshaw & Hutchinson, 1995; Freeborn, Shye, Mullody, & Romea, 1997). Intervention strategies developed to positively affect physician behaviour, and thus improve adherence, include continuing medical education (Davis, Thomson, Oxman, & Haynes, 1995), printed educational materials (Cabana et al., 1999), outreach visits (Bero, Grilli, & Grimshaw, 1998), feedback of cost data (Beilby & Silagy, 1997) and reminders and computerized decision supports (Hunt, Haynes, Hanna, & Smith 1998). However, a systematic review of intervention strategies to affect provider behaviour reported poor implementation effectiveness and a failure to meet clinical expectations (Grimshaw et al., 2004). Literature suggests that, rather than it being the sole fault of the individual provider, it is more likely that implementation progress is impeded by a broad range of contextual factors, including economic, administrative and organizational factors (Grol, Bosch, Hulscher, Eccles, & Wensing, 2007). Because these factors are reported to influence the success or failure of the QI initiative, this review of literature will now explore more closely, contextual factors underpinning the implementation process.

Independent Contextual Factors

Contextual factors have been widely researched as a means of understanding the determinants of effective innovation dissemination (Elliot, Taylor, Cameron, & Schabas, 1998; Burns & Wholey, 1998; Weiner et al., 2008). Studies examining the independent contributions of these factors to the implementation process have identified a vast array of influential factors - for example, the appropriateness of the clinical setting as a facilitator of ideal uptake (Cabana et al., 1999; Eccles, Walsh,

& Ingledew, 2003; Bradley, Schlesinger, Webster, Baker, & Inouye, 2004; Grimshaw et al., 2004). The degree of participative management of providers was another factor shown to impact initiative effectiveness (Grol, 2001; Sterling, 2003). A number of studies revealed two or more factors as influential in the implementation process. In a study examining implementation of the TUPE (Tobacco Use Prevention Education) program in high schools, Boerm, Gingiss, and Roberts-Gray (2007) identified a number of features that influenced the effectiveness of the health education program implementation including: (a) lack of an evidence-based curriculum; (b) lack of staff development and training affecting program fidelity; (c) lack of available resources, specifically funding for staff training; (d) grass-roots level involvement of well-informed and enthusiastic individuals; and, (e) strategies to identify needs as well as planning, implementing and evaluating initiatives. These findings were consistent with Kamuzora and Gilson (2007) who explored the reasons for low enrolment in an innovative community health fund. Findings relating to experiences of implementing community health schemes in this two-phased qualitative study revealed a number of key features reported as having a negative influence on implementation outcomes including: (a) lack of buy-in by key staff; (b) lack of clarity in roles and responsibilities; (c) lack of funding for administrative duties; (d) lack of trust in fund managers; (e) lack of education; (f) lack of planning; and, (g) excessive workloads. Similarly, a qualitative field study conducted by Gagnon, Duplantie, Fortin, and Landry (2006) identified a number of key features that should be considered when implementing telehealth initiatives into rural and remote clinical practice. These included perceived ease of use, provider motivation, availability of resources, investment in technologies and infrastructure and access to technology specialists.

Implementation of e-health technology was also the focus for Ahmad et al. (2002) who identified a number of key features relating to the successful implementation in a multi-hospital environment of a computerized physician order entry system. At the end of the two-year implementation period, the authors described their health region's experience in a commentary paper that reported a number of features that

contributed to the success of their e-health initiative consistent with other studies in this field. These features included acknowledging the importance of continuous executive support, physician empowerment, an effective implementation team, a consistent user-friendly interface, ongoing user support and an implementation plan that was prepared for a two-year period. Implementation effectiveness has also been studied in community health settings. A qualitative study exploring implementation of advanced access in primary care by Offredy and Ahluwalia (2006) employed purposive sampling and semi-structured interviews to gather data. Planning, early staff involvement, resources, measurement and resistance to change were identified as key features influencing effective implementation. Similarly, authors reporting on a system-wide implementation of Assertive Community Treatment (ACT) in Ontario identified involvement of senior staff, availability of planning and performance data, teamwork and technical assistance as key features of effective implementation (George, Durbin, & Koegel, 2008).

To date, research focussed on targeting provider behaviour and the study of the contributions afforded by independent contextual factors has provided important information to implementation scholars. However it only addresses a portion of the implementation puzzle as it has failed to address the complexity associated with interplay and interdependence between factors (Klein & Sorra, 1996). This complexity necessitates a more holistic and inclusive lens to examine and understand implementation which is explored further in the next section.

Implementation Frameworks

The emergence of implementation models[1] and their theoretical underpinnings provide a promising line of enquiry to understanding the black box of implementation. Models are a useful way to

[1] Models and frameworks are used interchangeably in this study

bring a collection of ideas and concepts together into our awareness. Through this awareness individuals may make sense of the environment in which they operate, organize their thinking, and reduce apparent chaos through focus and priority-setting. This increase in awareness also affords the opportunity to identify conditions and factors existing in the environment that affects dissemination of ideas and concepts (Wright, 2005). The following sections in this review of literature provide an overview of seminal work by six implementation scholars who have added substantive contributions to understanding implementation: (1) diffusion of innovations theory (Rogers, 1995, 2003); (2) integrative model of determinants of effectiveness of organizational implementation (Klein & Sorra (1996); (3) promoting action on research implementation in health services framework (Kitson et al., 1998); (4) quality enhancement research initiative framework (Stetler, McQueen, Demakis, & Mittman, 2008); (5) conceptual model for considering determinants of diffusion, dissemination and implementation of innovations in health service organizations (Greenhalgh et al., (2004); and, (6) organizational change management model (Molfenter et al., 2005).

Diffusion of Innovations Theory

Key constructs of Roger's classic *diffusion of innovations* theory (Rogers, 1995) identified that the process of introducing a new idea into the workplace and moving through to its sustained use, was composed of a series of five stages occurring over time: (1) knowledge – the individual learned about the innovation; (2) persuasion - the individual formed an attitude toward the innovation; (3) decision – the individual reached a decision on whether to adopt or reject the innovation; (4) implementation – the individual put the innovation into practice; and, (5) confirmation – either the individual agreed and adopted the innovation as best practice or rejected the innovation, at which point the innovation was discontinued (Rogers, 1995). Interfacing with these progressive stages was the influence of *adopter characteristics* which according to Rogers (1995), were described as innovator, early adopter, early majority, late majority, or laggard (also known as late adopter). These characteristics were reported to

affect the rate at which an individual would adopt an innovation. Individuals characterized as early adopters were often identified as champions and change agents, who influenced the adoption process within the social system in which the innovation was being implemented (Dearing, 2008). The diffusion of innovations in healthcare has long been recognized as a significant challenge (Berwick, 2003). However an understanding of adopter characteristics and stages of innovation was reported to be of benefit to improvement teams within organizations (Haider & Krepps, 2004). To accelerate the rate of diffusion of innovations, Berwick (2003) suggested that in addition to trust, flexibility and leadership, innovators should be found and supported, investment should be made in early adopters, and the activities of early adopter activities should be observable. This was consistent with previous findings on innovation characteristics where process and outcomes measures of an innovation were available that provided opportunity for individuals to evaluate results (Steckler, Goodman, McLeroy, Davis, & Koch, 1992).

Observability was one of five innovation characteristics that Rogers (1995) identified as influential to the rate of adoption and implementation. The remaining four included: (a) compatibility – fit with the organizations' values, goals and objectives; (b) complexity – innovation was user-friendly and/or the communication plan was clear and coherent; (c) relative advantage – perceived benefits of the innovation outweighed previous methods; and, (d) trialability – small tests of change were performed prior to organization-wide adoption. Steckler and colleagues revealed that, when measuring the influence of a number of variables affecting implementation, relative advantage, complexity and observability achieved significant factor weightings (complexity = .83; relative advantage = .88; observability = .77) (Steckler et al., 1992). Although not identified in Rogers' theory, risk and cost-efficiency were also identified as influential characteristics to implementing worksite health promotion innovations (Orlandi, 1986).

Rogers' diffusion of innovation theory (1995) has provided the theoretical backdrop for a number of implementation studies and discussion papers. Scott, Plotnikoff, Karunamuni, and Rodgers, (2008)

developed a questionnaire based on Rogers's (1995) classic theoretical constructs to identify factors that influenced the adoption of the Canadian heart health kit. Findings revealed that relative advantage and observability of the kit were significantly associated with physicians' intent to use the kit as part of routine clinical practice in Western Canada. Harting, Rutten, Rutten, and Kremers (2009) used Rogers' (1995) diffusion of innovations theory to examine determinants of guideline adherence by physical therapists in the Netherlands. Harting and colleagues employed purposive sampling to recruit participants for the study's focus groups, ensuring appropriate representation of age, gender and experience. Using Rogers' *innovation decision process* as a pre-determined coding structure for data analysis, authors concluded that the theory provided a user-friendly platform that afforded enhanced understanding of physical therapists' behaviour toward adoption and diffusion of Dutch guidelines for low back pain. Rogers (1995) model was also proposed as a framework to implement a managed care curriculum for continuing medical education (Mast, 1997). Characteristics of the medical education program including time, communication channels and the hospital's social system within the hospital were discussed as key features influencing program implementation.

Despite widespread acknowledgement of Rogers' (1995) diffusion theory, Rogers levelled criticism at his own early classic diffusion theory, identifying issues with pro-innovation bias and individual blame bias (Haider & Krepps, 2004). Consequently, a renewed theory of innovation was proposed (Rogers, 2003). The issue of pro-innovation bias related to the need to consider re-invention and rejection of the innovation rather than presuming that an innovation remained unchanged during adoption/implementation and was always adopted - an assumption underlying Rogers' early innovation research. In reality, the innovation often underwent some changes to fit the organization and on occasion, the decision was made to reject continued use of the innovation as it failed to meet expectations (Rogers, 2003). The second issue, described by Rogers as individual blame bias, referred to holding the individual responsible for adoption and implementation, rather than the system. As identified by leaders speaking on

behalf of those working in complex healthcare environments (Berwick, 2003), the need was identified to shift the emphasis away from quality being the sole responsibility of the frontline practitioner to shared accountability within the system (CPSI, 2002). This perspective was shared by Reason (2000) who identified that when an adverse event occurred, the important issue was not who made the error but how and why the event occurred. In a revised edition of diffusion of innovation theory Rogers proposed a five-staged organizational model that built on the aggregate knowledge of implementation at the individual provider level identified in his early work (Rogers, 2003). The five stages included: (i) agenda setting; (ii) matching; (iii) redefining/restructuring; (iv) clarifying; and, (v) routinizing. Although individual constructs of this stepwise model have been discussed (Dearing, 2008), there is an absence of evidence on the application of the model in the field setting.

Integrative Model of Determinants of Effectiveness of Organizational Implementation

Klein and Sorra (1996) developed a model to address the multi-dimensional, multi-level phenomenon of innovation implementation. The premise of the *integrative model of determinants of effectiveness of organizational implementation* model was that implementation effectiveness (quality and consistency of organizational use) was a function of: (a) an organization's climate, and (b) perceived fit of the innovation to organizational members' values (Klein & Sorra, 1996). An organization's climate for innovation implementation indicated that "targeted employees' shared summary perceptions of the extent to which their use of a specific innovation is rewarded, supported and expected within their organization" (Klein & Sorra, 1996, p. 1060). A strong implementation climate was reported to foster innovation use by: (a) ensuring skill in innovation use; (b) providing incentives for innovation use and disincentives for innovation avoidance; and, (c) removing obstacles to innovation use. The second premise of this model identified implementation effectiveness as being a function of individuals' perceptions of the fit of the innovation with important workplace values (Klein & Sorra, 1996). This in turn affected the degree of commitment by an individual to the innovation which influenced the rate of innovation adoption. A poor

innovation-value fit resulted in employee opposition and resistance with innovation use being no more than compliant. An employee with a neutral fit was identified as being indifferent resulting in adequate use of the innovation. Good innovation-value fit resulted in enthusiastic employees whose use of the innovation was committed, consistent and creative.

Field testing of Klein and Sorra's (1996) model was conducted by Holahan, Aronson, Jurkat, and Schoorman (2004) who proposed that in addition to the constructs identified by Klein and Sorra (1996), the role of receptivity toward change was also an important element in implementation effectiveness. By using quantitative survey methods, researchers examined determinants of implementation effectiveness through the use of computer and telecommunication technologies to teach science in a sample of 69 schools. Researchers tested three hypotheses: (1) implementation climate was positively related to implementation effectiveness; (2) implementation climate would mediate the effect of organizational receptivity toward change on implementation climate; and, (3) innovation-values fit would be positively related to implementation effectiveness. Using multiple regression analyses to test the hypotheses, Holahan and colleagues' findings supported the major theoretical proposition of Klein and Sorra's (1996) model that the role of climate for implementation is a significant predictor of implementation effectiveness. Furthermore, findings revealed support for the antecedent, receptivity toward change, which acted as a mediating variable to the effect of organizational climate on implementation effectiveness. However, researchers did not find support for the relation between perceived innovation-values fit and implementation effectiveness. This finding was not generally supported in a more in-depth review of innovation-values fit research. In a study examining the adoption of information technology by healthcare professionals, Burley, Scheepers, and Fisher (2005) reported that professionals must see value of the new innovation in their day-to-day work, a finding supported by Helfrich, Weiner, McKinney, and Minasian (2007) who also found the concept of innovation-values fit was a critical determinant of a framework to effective implementation. Furthermore, in Rogers (2003) organizational model, the

construct ‘matching’ included procedures to ensure the fit of the innovation to the organization (Rogers, 2003) although this model was not subjected to the statistical rigor afforded by Holohan et al. (2004).

Klein and Sorra’s (1996) model was further refined by Klein, Conn, and Sorra (2001) in an organizational analysis of the implementation of computerized technology in the manufacturing industry. In response to their enquiry of why some organizations succeeded while others failed, Klein and colleagues tested the influence of management support and availability of financial resources on implementation effectiveness. Through conducting a series of regression analyses, they found that financial resource availability, management support and implementation policies and practices together explained 37% of the variance in implementation climate, although only management support was significantly related to implementation climate. This finding was contrary to the original findings from the 1996 model studies. However other significant findings indicated that financial resource availability was significantly related to implementation policies and practices. Klein and colleagues concluded that, although results were preliminary, there was sufficient evidence to indicate the critical role of management support, financial resource availability and implementation policies and practices on the implementation process. The sequential nature of these constructs however, remained unclear.

Although originally developed and tested in non-healthcare settings, the principles identified by Klein and Sorra (1996) and further expanded by Klein et al. (2001) and Holahan et al. (2004) have begun to be embraced by research in the healthcare setting. Helfrich et al. (2007) expanded on Klein and colleagues’ work to include management support, innovation-values fit, innovation champion, implementation climate and resource availability as critical determinants in their framework for complex innovations. Similarly, Weiner and colleagues proposed a theoretical model in which effective implementation was described as a function of: (a) organizational readiness for change; (b) implementation policies and practices; (c) implementation climate; and, (d) implementation effectiveness. Application of Weiner’s theory was described in the context of a large US worksite cancer prevention

trial – the Working Well Trial. In this theory, organizational readiness was defined in terms of a shared resolve between employees and management, acknowledging the importance of working in partnership to move an initiative forward. This stage in the model clearly articulated that organizational readiness was initiative specific i.e., readiness may be high for one innovation but low for another. The second theoretical construct - implementation policies and practices - referred to the organizational infrastructure required to support innovation use. Key factors were identified as being part of the required infrastructure including: (a) accessibility and availability of training; (b) technical assistance; (c) involving staff; (d) incentives; (e) feedback on use of innovation; and, (f) process design to optimize innovation fit with the organization's existing work processes. The third construct defined by Weiner et al. (2008) as implementation climate referred to whether the use of innovation was rewarded, supported and expected.

The fourth theoretical model construct identified by Weiner and colleagues was implementation effectiveness which related to the appropriateness, consistency and quality of innovation use. These four model constructs were reported to be mediated by innovation-values fit which in turn, affected outcomes i.e., innovation efficacy and effectiveness. This theory of implementation remains at the conceptual stage of development and requires application in the research setting to test theoretical constructs. Although appealing in theoretical implications, the theories proposed by Helfrich et al. (2004) and Weiner et al. (2008) do not appear to have been subjected to the level of rigour applied by Klein and colleagues. Furthermore, there is a paucity of examples and evaluation of applying the theory to implementation in the healthcare setting.

PARIHS Framework

The *promoting action on research implementation in health services* framework (PARIHS) was developed by Kitson et al. (1998) in response to a lack of success of previous frameworks in implementing research findings in UK healthcare environments (Haines & Jones, 1994; NHSE, 1996;

Walshe & Ham, 1997). The research and development team from the Royal College of Nursing Institute in the United Kingdom, responsible for developing the PARIHS framework, identified the need to address the dynamic dependency of relationships between factors influencing the implementation of research findings into clinical practice (Kitson et al., 1998). Developed using experiential knowledge, the framework presented in 1998 was intended to stimulate discussion from implementation scholars on its construct validity. Underpinning the framework were three dimensions - evidence, context and facilitation - which were presented in equation format as SI=f(E,C,F) (Kitson et al., 1998, p. 150). When assessing the nature and strength of *evidence*, defined as a composite of research, clinical expertise and patient choice, Kitson and colleagues reported that consideration of all three sub-elements of evidence was required when determining its influence on implementation. The second dimension, *context*, was defined as "the environment or setting in which the proposed change is to be implemented" (Kitson et al., 1998, p.150). This dimension was also identified as being composed of three sub-elements: understanding of the prevailing culture, nature of human relationships, and monitoring of systems and services. The final dimension, *facilitation*, was defined as "a technique by which one person makes things easier for others" (Kitson et al., 1998, p. 152). The dimension captured a variety of tasks and nuances associated with organizational and behavioural change, for example: support to change attitudes, habits, skills, and work processes. In addition to the existence of key dimensions, the research team proposed that dimensions lay on a high-low continuum. Based on using this continuum, innovations that scored highly on the three dimensions were predicted to be more effectively implemented than if scored toward the lower end of the scale.

The framework was tested in four case studies. Findings revealed that there exists interdependency between the three key dimensions. Optimal implementation effectiveness was achieved when there was high evidence, high context and high facilitation noted on the continuum scale. Findings from testing the framework revealed that in some instances where facilitation and evidence were high but

context low, it was still possible to achieve effective implementation as the two strong dimensions acted as a catalyst to positively affect context (Kitson et al., 1998).

Since 1998, the PARIHS framework has been reviewed, refined and been subjected to empirical testing (McCormack, Kitson, Harvey, Rycroft-Malone, Titchen, & Seers, 2001; Rycroft-Malone et al., 2002; Rycroft-Malone et al., 2004). Although the inclusion of the three key dimensions remained unchanged, the level of detail underlying each dimension changed over time. Critical review of the framework in 2001 focussed on the dimension context, which revealed that the term *measurement* was too narrow in its application and was better explained by *evaluation*. Rationale for this amendment to the framework was based on the findings of Deming (1991) and Donabedian (1988) who reported that measurement was more complex than collecting and interpreting numbers. Rather, these authors concluded that there were a number of ways that the clinical setting measured improvement including: cost effectiveness, individuals' perceptions and feedback adjusted (providers and patients), peer review and reflection on practice. Consequently, in order the capture the complexity of this element of context, McCormack et al. (2001) renamed the sub-element measurement in the 1998 PARIHS framework as evaluation. Further refinement of the framework continued in the 2002 and 2004 versions, with additional clarification, driven by qualitative techniques, of the third dimension - facilitation (Rycroft-Malone et al., 2002; Rycroft-Malone et al., 2004; Rycroft-Malone, 2004).

However, a consistent finding through the years of refinement of the PARIHS framework was the lack of clarity with which each dimension was characterized. This has led to methodological issues with an inconsistency in research design and thus an inability to compare studies across the field examining the influence of each dimension on the implementation process (Rycroft-Malone, 2004). Although the framework has been subjected to further analysis which provides some face validity, there continues a lack of empirical testing of construct validity which if performed, would provide additional theoretical rigour and conceptual clarity to the three dimensions.

QUERI Framework

Despite being a critical part of enhancing quality of healthcare, the process involved in knowing how best to move research findings into clinical practice has received minimal attention (Krein et al., 2008). In response, the Veteran Affairs' *quality enhancement research initiative* (QUERI) was established to formally link research and clinical practice to improve the quality and outcomes of care (Rubenstein et al., 2000). Using an innovation approach, the framework is a composite of three key elements: (1) culture; (2) capacity; and, (3) infrastructure, and was designed in part to provide a systematic approach to moving research into clinical practice (Graham & Tetroe, 2008). Six steps were originally identified in the QUERI framework including: Step 1 - identification of high risk/high volume diseases or problems; Step 2 - identification of best practices; Step 3 - definition of existing practice patterns and outcomes as well as variations in practice; Step 4 - identification and implementation of interventions to promote best practices; Step 5 - documentation of best practices that improve outcomes; and, Step 6- documentation of outcomes associated with improved health-related quality of life (Stetler, Mittman, & Francis, 2008). The ultimate outcome of the QUERI framework was identified as facilitating the improvement of healthcare quality (Bowman, Sobo, Asch, & Gifford, 2008). Although not included in the original version, the revised QUERI framework was reported to promote the use of supplementary frameworks during step four (identify and implement interventions to promote best practice) to provide detailed guidance to implementers, depending on the innovation. Revisions to the original QUERI framework also included the requirement to conduct a pilot test prior to wide-spread diffusion (Stetler, McQueeen, Demakis, & Mittman, 2008).

In assessing the usefulness of the QUERI framework to facilitate implementation, Goetz et al. (2008) employed quasi-experimental design research to study the implementation of a regional strategy that affected testing rates of patients at risk of HIV. Preliminary data obtained during a pilot study indicated that the use of the QUERI framework to guide implementation resulted in a three to five-fold

increase in the proportion of at-risk patients who were offered HIV testing, compared to the control site where no change was reported suggesting implementation effectiveness (Goetz et al., 2008). Goetz and colleagues' decision to include the chronic care model during step four was reported to provide additional guidance on the detailed activities pertaining to implementation (Goetz et al., 2008).

However, Krein et al. (2008) studied implementation of an intervention to enhance eye care for diabetic patients using the QUERI framework and did not achieve the successes espoused by Goetz and colleagues. Although the stepwise framework was reported to have some benefit in moving through steps one through three, Krein and colleagues did not successfully implement their proposed prototype scheduling system as anticipated. Four factors were identified as substantial challenges encountered by the research team during implementation. First, the incompatibility of technology-based tools with existing electronic clinical records resulted in a substantial budget over-run that ultimately ended with little to show for it. That is, the information technology system currently used by the Veteran Affairs (VA) health system would not support additional interfaces such as the proposed clinical scheduling tool. This resulted in a noticeable reduction in staff enthusiasm for the improvement initiative as the promise of an improved system did not materialize (Krein et al., 2008). The second challenge noted the negative impact of failing to align a planned change with system policy as part of creating tension for change. The lack of garnering local support for the initiative was also raised as an issue. Although support was initially secured in local leadership, support waned over time as other issues took priority. In essence this created a negative capacity issue for staff in the eye clinic. The final challenge reported by authors related to the need for participants to have a clear understanding of the environment in which the initiative was being implemented. Krein and colleagues remarked that there would have been value in assessing the impact of the innovation on the rest of the clinic's practice. In writing conclusions to their study, researchers acknowledged that without a specified funding mechanism (i.e., QUERI funding) for implementation, the initiative would not even have reached the third step of identifying gaps in quality.

Although Krein and colleagues reported failed implementation, the reporting of both positive and negative research findings has been praised by Graham and Tetroe (2008) who noted that healthcare can benefit from all types of experiential learning – successes and failures. The stepwise format of the QUERI framework holds promise for implementation scholars. Although the QUERI framework appeared to contribute important information to the field of implementation science, two areas of future enquiry emerged from this review of literature. The first related to the discretionary inclusion of supplementary frameworks during step four of the framework which did not appear to have been analyzed as a potential mediating variable of QUERI framework effectiveness. The second issue related to the lack of direction within the framework relating to importance of influencing factors. Both the HIV and diabetes studies reported on the importance of considering factors such as leadership, team buy-in, addressing facility-specific barriers and customization of the screening tool to meet site-specific needs. However, these factors were not formally included in the QUERI framework.

Organizational Change Management Model

The diversity of contextual factors[2] identified in the implementation literature revealed a lack of consensus on which factors were critical to effective implementation. Identification of critical success factors was reported as the underpinning of quality management in the manufacturing industry (Deming, 1986; Crosby, 1979) where top management leadership, employee involvement, employee training and supplier quality management have been identified as being critical in gaining competitive advantage (Badri, 1995). The emergence of organizational change management models using the principles of *Bayes' theorem* has brought research findings from the manufacturing business (Saraph, Benson, & Schroeder, 1989; Badri, 1995; Claver, Tari, & Molina, 2003; Finney & Corbett, 2007) into the healthcare

[2] Factors encompass determinants, constructs, elements and features as used across the field of implementation science.

domain (Gustafson et al., 2003; Spiegelhalter, Myles, Jones, & Abrams 1999; Olsson et al., 2003; Olsson, Eng, Elg, & Molfenter, 2003; Molfenter et al., 2005).

Bayesian organizational change management models have been developed using the *integrative group management process* (IGP) (Gustafson, Cats-Baril, & Alemi, 1992); a statistical process for synthesizing experts' opinions. This IGP process, conducted by Molfenter et al. (2005), encompassed ten steps in selecting factors and model quantification. This resulted in the development of a sixteen factor model pertinent to the organizational level of healthcare systems. The sixteen-factor model delineated strong positive, minor and strong negative influences for each factor – a concept similar to the high-low continuum in the PARIHS framework developed by Kitson et al. (1998). The sixteen factors, categorized into three environmental categories of the healthcare system: external, organizational and microsystem, are presented in Table 1.

The OCM model developed by Molfenter et al. (2005) was tested to evaluate the model's accuracy in predicting implementation success and sustainability during a multi-organizational cardiovascular surgery improvement collaborative, over a two year period. Results revealed that the [relationship between] model's predicted score and observed data in the study was very significant ($p < .0001$) indicating that the model was successful at predicting implementation. These findings were consistent with previous studies that applied principles of Bayes' theorem in the determination of critical success factors. Gustafson et al. (2003) used the IGP process for combining experts' views to build a model for predicting the success or failure of change projects within the healthcare setting. Described as the American OCM model, Gustafson and colleagues identified seventeen factors that influenced implementation. Similarly, Olsson et al. (2003) repeated the American study in Scandinavia, which resulted in development of the Swedish OCM model that consisted of eleven factors capable of predicting successful organizational change.

Table 1

Molfenter et al. (2005) Organizational Change Management Model – Critical Success Factors

Environment Categories in Healthcare System	Factors
External Environment	Source of Ideas
	External Influence
Organizational Environment	Mandate
	Middle Manager Goals, Involvement & Support
	Funding
Microsystem Environment	Work Environment
	Clinical Champion
	Staff Needs Assessment, Involvement & Support
	Tension for Change
	Exploration of Problem & Needs
	Advantages to Staff & Patients
	Flexibility of Design
	Complexity of Implementation Plan
	Staff Changes Required
	Monitoring & Feedback

The Swedish model was subjected to a series of tests to establish reliability and consistency of the factors' ability to predict successful implementation. Results revealed that the model predicted 80% of the successful improvement initiatives correctly, and falsely identified 20% as successful when they were not (Olsson, Øvretveit, & Kannerlind, 2003).

The use of Bayesian models to predict implementation effectiveness has also been studied in the school setting. Bosworth et al. (1999) identified eight factors relevant for prediction of successful implementation including: (i) facilitation process; (ii) resources; (iii) school based leadership; (iv) implementers; (v) external environment; (vi) external leadership; (vii) compatibility of innovation with the setting, and, (viii) innovation characteristics. Bosworth and colleagues concluded that although the model could be used by schools to guide and evaluate their implementation processes, more work was required to examine the model's content and external validity. Findings on the role of contextual factors identified in these Bayesian studies provided support to previous implementation studies where frameworks reported on determinants of implementation effectiveness but were not subjected to rigorous analysis (e.g., Helfrich et al., 2007; Weiner et al., 2008; Rycroft-Malone et al., 2004). This is an important contribution to implementation science. Although inferred in the OCM models, the lack of stepwise directions relating to sequencing of activities and consideration of factors omitted essential guidance for the implementer.

Conceptual Model for Diffusion, Dissemination and Implementation in Health Service Organizations

The final model in this review of literature was derived from a synthesis of theoretical and empirical findings conducted by Greenhalgh et al. (2004) who subsequently proposed a conceptual model for the healthcare environment. Key constructs of the *conceptual model for diffusion, dissemination and implementation in health service organizations*, summarized in Table 2, were findings from a large and

diverse field of enquiry relating to implementation in complex organizations (Greenhalgh et al., 2004). Described as a unifying model, i.e., one that captured major domains of implementation theory over recent decades, it was noted that the model served as a platform from which problems and issues could be raised. It was not intended as a prescription for effective implementation, but rather as a reflective tool to assist healthcare providers identify what they should be considering when implementing new ideas in healthcare. The model attempted to reconcile individual and organizational characteristics through identifying factors perceived to enable or inhibit implementation as well as system antecedents, system readiness, adoption/assimilation, implementation, and consequences. When reflecting back on the theories already presented in this review of literature, the model appeared to capture many of the determinants and constructs identified as being influential to the implementation process in healthcare.

Newhouse (2007) applied the Greenhalgh et al. (2004) model as a framework to identify potential barriers and enablers of building infrastructure for evidence-based practice planning. Newhouse reported that organizational level strategies such as evidence-based practice infrastructure could be informed by the conceptual model for considering determinants of diffusion, dissemination and implementation of innovations in the complex healthcare environment. Although this literature-generated model appeared compelling in its inclusiveness, the practicality of its application to the implementation process may be overwhelming for the average healthcare implementer and thus will likely remain as a conceptual model.

Table 2

Summary of Greenhalgh et al. (2004) Theoretical Model Constructs

Model Domains	Description
Innovation	Relative advantage, compatibility, low complexity, trialability, observability, potential for re-invention, fuzzy boundaries, risk, task issues, nature of knowledge required, technical support.
System Antecedents	Structure (size/maturity, decentralization, slack resources), absorptive capacity for new knowledge, receptive context for change (leadership/vision, clear goals & priorities, high-quality data capture).
System Readiness for Innovation	Tension for change, innovation-system fit, supporters vs. opponents, assessment of implications, dedicated time/resources, monitoring & feedback.
Adopter	Needs, motivation, values & goals, skills, learning style, social network.
Assimilation	Complex, non-linear process, soft periphery elements.
Implementation Process	Decision-making devolved to frontline teams, hands-on approach by leaders, human resource issues, dedicated resources, internal communication, external collaboration, reinvention/development, feedback on progress.
Linkage	Design and implementation stages.
Outer Context	Socio-political climate, incentives and mandate, inter-organizational norm-setting and networks, environmental stability.
Communication and Influence	Diffusion (social networks, homophily, peer opinion, marketing, expert opinion, champions, boundary spanners, change agents) and dissemination (formal, planned).

Summary of Implementation Framework Research

Implementation science appears rich in both diversity and depth of study, providing important theoretical knowledge that has potential to enhance QI implementation in healthcare. Emerging concepts from three foci of implementation research provided valuable insight into processes for enhancing implementation effectiveness of QI initiatives in healthcare including the role of healthcare provider behaviour, the role of independent factors and the possibilities afforded by implementation frameworks. While provider behaviour and the role of independent factors contributed important information, a number of frameworks were identified that provided a fuller understanding of implementation. One focus of framework enquiry studied the role of influential factors (e.g. Klein and Sorra, 1996; Kitson et al., 1998; Molfenter et al., 2005) while another focussed more on the sequential nature of the implementation process (e.g., Stetler et al., 2008; Rogers, 1995). Furthermore, others attempted to reconcile the two foci, resulting in a stepwise framework that raised awareness of the role of contextual factors (Rogers, 2003; Greenhalgh et al., 2004). However, framework strengths appeared to be tempered by gaps or omissions which suggested that implementation science has not yet identified the ideal prescription for effective implementation in healthcare.

A recurring issue common to the implementation frameworks was the variation in how constructs were defined and described in terms of sub-constructs and meaning. For example when the framework developed by Kitson et al. (1998) was subjected to further analysis, McCormack et al. (2002) reported that the construct context did not represent the factor for which it was intended. This construct was oversimplified by collapsing independent subcategories such as boundaries, power and authority. Similar issues were also identified when analyzing the *conceptual framework of complex innovation implementation* (Helfrich et al., 2007). If subjected to validity analysis, i.e., testing of construct validity, it was unclear whether a test score on determinants such as support, commitment, culture and climate would provide a consistent measure applicable across the field of enquiry relating to implementation

effectiveness due to the variation in meaning of these terms. The capability of Bayes' theorem to enhance construct validity positioned the OCM models well to contribute to the development of a theoretically and statistically generated framework that could move forward implementation research in healthcare. However, the lack of sequential directions, such as provided by Rogers (1995, 2003) in his individual and organizational diffusion models, was an omission of the OCM approach, leaving the implementer without vital information. The QUERI framework also fell short of inclusiveness, arising from the omission of detailed implementation planning at the critical step four in the framework. Additionally, the need to pursue supplementary frameworks as part of the overall QUERI framework simply identified the need for a more inclusive model that consisted of both the big picture as well as a sufficiently detailed implementation plan that provided a step-by-step guide for implementers.

The theory underpinning the implementation process and research is complex and in some instances, overwhelming (Greenhalgh et al., 2004). Although knowledge of the factors that are influential to effective implementation is valuable to the implementer, there remains the issue of translating this knowledge of implementation theory reliably into intervention design. Rycroft-Malone (2004) noted that it was a feasible option for the PARIHS framework to be used as an aide-memoir. This review of literature now explores more closely, research relating to the use of checklists as a mechanism to translate implementation theory into routine practice for healthcare practitioners charged with the responsibility of designing, planning and implementing QI initiatives.

Use of Checklists in Healthcare Organizations

The existence of aide-memoirs is already under scrutiny in the clinical setting through the examination of checklists. Checklists have been described as mnemonic devices which reduced the chances of forgetting to check something important (Scriven, 2000). Thus they acted as a visual prompt rather than relying on implementer's memory alone (Hart & Owen, 2005). Described as the Rorschach

effect, i.e., the tendency to see what one wants to see (Scriven, 2000), findings by Scriven (2000) suggested that a checklist could be of particular value when an exciting idea was discussed. The checklist would then prompt the user to force a separate judgment on each checklist item and rather than just see what they wanted to see, i.e., their idea being taken forward, it prompted a reality check on whether there was capacity and infrastructure to move forward the idea into routine practice. A well designed checklist addresses human factors and safety principles including the reduction of reliance on memory, standardization of processes, improvement of information access and provision of feedback (Reason, 1995).

The use of audit checklists in the clinical setting is not a new concept. Checklists have been used to: improve communication within surgical teams (Lingard et al., 2005); improve anaesthesia preparation for Cesarean deliveries (Hart & Owen, 2005); reduce life-threatening mistakes and omissions in the intensive care unit (Simpson, Peterson, & O'Brien-Ladner, 2007); and, reduce morbidity and mortality of surgical patients (Haynes et al., 2009). The study by Haynes and colleagues revealed that implementation of a surgical safety checklist was associated with significant reductions in the rates of deaths and complications arising from non-cardiac surgery in a diverse group of hospitals. These findings were particularly meaningful as hospitals in the study represented first-world and developing countries, all of whom were participating in the World Health Organization's Safe Surgery Saves Lives program. Despite these encouraging studies on the use of checklists, their application does not extend to a broader use, such as application as an intervention tool to enhance implementation effectiveness of QI initiatives.

Summary

Implementation of QI initiatives in healthcare is described as a complex, multi-staged iterative process influenced by a variety of individual, organizational and systemic factors. Healthcare has borne witness to a paradigm shift in which responsibility for implementation effectiveness has shifted from an

individual healthcare provider to systemic responsibility. In response to public criticism of healthcare services, renewed focus and increased investment has led to increased opportunities and expectations to implement QI initiatives as a means of enhancing the quality of patient care. Studies exploring the black box of implementation have revealed a number of recurring themes as well as a rich diversity of approaches to innovation implementation. An issue arising from this diversity is a lack of practical directions for the frontline healthcare provider to implement effectively. Limited research has examined the critical features of implementation pertinent to the frontlines of healthcare. Further research is necessary to confirm applicability of these critical features as well as develop a practice tool that can reliably translate implementation theory into clinical practice. This provides the rationale for this study which explored the fit of the organizational change management factors, identified by Molfenter et al. (2005), in the context of the emergency department (ED) as well as the influence of an implementation audit checklist to facilitate QI implementation.

Research Questions

The following research questions guided this study:

1. What can be learned from healthcare professionals' experiences of implementing QI initiatives in the emergency department?

2. How do the evidence-based factors, from the organizational change management framework, listed in the implementation audit checklist, fit within the context of an emergency department?

3. What is the influence of an implementation audit checklist on healthcare providers who have responsibility for the design, planning and implementation of new QI initiatives in the emergency department?

Limitations

There were several limitations to this study. Data were collected only from practitioners working in emergency departments (EDs). Therefore the data may not be representative of all healthcare environments. Second, participants spoke of their experiences arising in urban and community EDs. There was no representation from rural EDs; therefore data may not be representative of all emergency settings in Western Canada. Third, although data saturation was achieved, it is not possible to predict effective implementation nor are findings transferable to other healthcare settings as the study purpose was to explore implementation in the ED by providing a rich and thick description, rather than testing the implementation audit checklist. Finally, as principal researcher, I may have influenced the interpretation of results. However, researcher bias is an integral element of qualitative research (Thomas et al., 2005) and consequently, is addressed in the methods section to enhance credibility of research findings.

Delimitations

The study comprised six face-to-face interviews and completion of six implementation audit checklists. Participants were delimited to ED practitioners who maintained current professional registration, held a formal leadership role within an ED and, had experience of implementing QI initiatives in the ED.

Operational Definitions

Implementation:	A course of action identified by the provider to put into practice an idea, concept or program (Weiner et al., 2008).
Quality Improvement (QI) Initiative:	An improvement activity within a system in order to improve some quality parameters of the system. Improvement is a deliberate action that does not happen by chance (Olsson et al., 2003).
Innovation:	A product or practice that is new to its developers and/or to its potential users (Klein & Knight, 2005).
Implementation Effectiveness:	The consistency and quality of use of the idea, concept or program (Klein & Sorra, 1996).
Innovation Effectiveness:	The idea, concept or program meets expectations and thus, a degree of effectiveness is achieved (Klein & Sorra, 1996).
Clinical Protocol:	A predetermined set of guidelines or rules that affects clinical decision-making and execution of care (Nguyen et al., 2007).
Contextual Factors:	Economic, administrative and organizational factors influencing implementation (Grol et al., 2007).
Diffusion:	The process through which an innovation is communicated over time among individuals operating in a social system (Rogers, 2003).
Decentralization:	Decision-making practices that balance the involvement of leadership and staff in information-processing, decision-making and problem-solving (Wagner, 1994).
Culture:	Social norms within an organization that are influenced by teamwork, security, power distance and authority; espouses a results orientation (Hofstede, Neuijen, Ohayv, & Sanders, 1990).
Climate:	Characteristics of an organization influencing the behaviour of individuals and groups including structure, support, risk and standards (Litwin & Stringer, 1968).

Chapter Three: Methods

Theoretical Perspective

This research studied the process underlying implementation of new QI initiatives in the ED. I was curious about how a new QI idea or process became embedded into practitioners' routine practice. To facilitate this I used an orientational qualitative inquiry approach. This approach provided an explicit theoretical perspective that guided the data collection and analysis (Patton, 2002). Specifically, I used the organizational change management (OCM) model described by Molfenter et al. (2005) and a checklist of implementation factors derived from the model to solicit perspectives from healthcare practitioners, practitioners who were hands-on involved in QI initiative implementation in the ED and who also held current or recent professional responsibilities as emergency physicians or nurses. Rather than testing the OCM model, I set out to explore its contents thus reflecting the perspectives of those working at the sharp end of healthcare i.e., where care is delivered. Participants' perspectives were elicited which the guided the development of themes and dimensions, from which implementation propositions were generated.

Philosophical Assumptions

The philosophical assumptions underlying this research are those relating to the social constructivism paradigm. Under the assumptions of this paradigm, healthcare practitioners develop subjective meanings of their experiences. These subjective meanings interact with the historical and cultural norms that operate within practitioners' lives (Creswell, 2009). As the researcher, it is my intent to gather and interpret these meanings while ensuring participants' voice and meaning shape the interpretation.

Strategy of Enquiry

I employed an instrumental case study design (Hancock & Algozzine, 2006) to gain insight into the theoretical underpinnings of QI implementation experiences. Historically, case studies have been used in the healthcare setting to explain efficacy of treatment protocols and process outcomes (Dellinger et al., 2008). The purpose of using a case study design was to enable an in-depth understanding and meaningful interpretation of the process underlying implementation (Yin, 2009), rather than the more conventional focus of verification of clinical outcomes arising from implementation of new treatment protocols (Shorr, Micek, Jackson, & Kollef, 2007).

Participants

In accordance with suggested methods for conducting qualitative research I utilized purposive intensity sampling (Patton, 2002) to recruit healthcare practitioners experienced in the implementation of QI initiatives in the ED context. The target sampling frame was a clinical protocol working group that had been charged nine months earlier with designing, planning and implementing a new sepsis protocol (QI initiative) for the ED. Membership of this group represented: emergency physicians and emergency nurses; urban and community emergency departments; frontline, middle and senior management; and males and females. Six emergency department staff (three physicians and three registered nurses) agreed to participate and signed the informed consent form prior to starting the research. This represented 80% percent of the working group. In addition to recent experience in implementing the sepsis protocol, participants reported both leadership and frontline experience in other QI initiatives. These included, but were not limited to: (a) implementation of an e-health initiative that ‘computerized’ all emergency departments in the region; (b) implementation of a patient streaming initiative that involved redesign of patient flow to enable patients to be seen more quickly by emergency physicians; and, (c) implementation of sepsis, asthma, paediatric oral rehydration and stroke clinical protocols. I deemed the sample size

adequate based on the specificity of research questions posed, the complexity of the issue being studied and the availability of healthcare professionals with the preferred level of experience (Ambert, Adler, Adler, & Detzner, 1995).

Setting

The setting for this study is the physical and social structures of the ED within which the sepsis protocol was implemented and the study took place. As described by the participants, the ED in this case was no longer ‘a department’ that provides emergency care. Rather, it is a complex system comprising five levels of leadership that lead and govern across diverse geographic regions including thirteen urban, community and rural emergency care departments. Within each ‘department’ there is a multitude of disciplines including emergency room physicians and registered nurses, licensed practical nurses, aides and clerks who, during the course of delivering patient care, consult and collaborate with professionals from medical imaging, laboratory, ambulance service and other speciality areas. A final layer of context for the emergency ‘department’ is at the level of decision/policy maker relating to patient care delivery including national research agencies, organizational administrators, unions, media, coroner services, Provincial government and lawyers. It is in the context of this setting that the six participants talked candidly about their experiences in working to design, plan and implement the sepsis protocol and other QI initiatives.

Instrumentation

A checklist was designed for this study that encompassed the sixteen factors identified by Molfenter et al. (2005) to predict successful implementation of QI initiatives in healthcare.. I translated the model into a checklist based on the successful use of checklists in other areas of healthcare services (Hales & Pronovost, 2006; Wolff, Taylor, & McCabe, 2004). The checklist was tested by six frontline healthcare providers prior to the study to assess: (a) readability; (b) format; and, (c) efficacy of

completing a ‘word form’ format of the checklist that could be completed electronically. The feedback from healthcare providers doing the tests was positive, reporting that the checklist: (1) quick and easy to fill out; and, (2) no printing or mailing required. Based on this feedback, the checklist presented in the study used the ‘word form’ electronic format.

Ethical Considerations

Qualitative research designs require rigorous ethical considerations (Locke et al., 2007). To ensure that the research complied with principles set out in the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (1998), I obtained approval from the UVic/VIHA Joint Research Ethics Sub-Committee.

Data Collection Strategies

I collected data using two research methods implemented over a four week period. First I administered an implementation audit checklist at a time and location convenient to each participant. The checklist (shown in Appendix 1**)** was designed to illicit two types of descriptive data – numerical and text. Participants considered each of the 39 checklist statements as it related to their experiences with designing, planning and implementing the sepsis protocol. For each statement, participants identified whether: (a) the statement was correct (i.e., yes, no or don’t know); and, (b) how important the participant perceived the statement to be (i.e., critical, helpful or not important). The second type of data provided by the checklist was obtained from the free text boxes in which participants wrote comments and explanations for their ratings. Participants also described their feelings and opinions relating to the statements that they had just rated. In these free text boxes, comments were also included relating to experience arising from other QI implementation initiatives. Participants reported that completion of this activity took between 30 to 60 minutes. Participants retained a copy of their checklist for future reference.

The second research activity was a face-to-face semi-structured interview with the principal investigator, four weeks after checklists were completed. Interviews were conducted in an office located convenient to where participants worked. Procedures for ensuring continued consent occurred prior to the interview commencing. The semi-structured interview provided a forum for each participant to further discuss the content of the implementation audit checklist in the context of the ED. A set of predetermined questions provided structure to help focus the discussion towards the research questions. I also asked their impressions of the checklist and its influence as a resource to assist healthcare providers charged with responsibility for the designing planning and implementing QI initiatives in the ED. Interviews lasted between 70-90 minutes. During the interview I (as the researcher) "interacted directly with participants, determining from moment to moment how to behave, what to notice and record, and how a particular line of inquiry did or did not offer promise for answering the research question" (Locke et al., 2007, p100). All interviews were audio-recorded with permission from participants. The interview schedule can be found in Appendix 2.

Data Analysis

This study used the constant comparative method of qualitative data analysis to synthesize common challenges that participants reported and solutions suggested addressing these challenges (Creswell, 2009). Contributions were analyzed and coded across professions rather than between. During its development, I reviewed the code structure for logic and breadth as per Bradley et al. (2004). The process of refining the code structure included adding and reconstructing codes as new dimensions emerged and identifying new relationships between dimensions. There were two steps to the data analysis: (1) collating data and cursory review, and, (2) coding data into parent/child nodes and identifying relationships to establish themes.

Step 1: Collating Data & Review of Early Data

Checklists

The first step in data analysis commenced as soon as the principal investigator received completed checklists. Analysis of the six checklists was conducted in two parts – handling of quantitative perceived ratings and handling of free text boxes. Each participant's checklist was reviewed separately to look for comments or ratings that required follow up by the researcher in the face-to-face interviews. Perceived ratings were collated across participants and tabulated. This enabled some weighting to be applied to each statement i.e., the number of times 'critical', 'helpful' or 'not important' values were assigned. Discrepancies between participants' ratings were noted for follow-up in interviews.

Similarly, text written in checklist text boxes was then read and compared across the six participants to identify recurring words and themes that required follow-up in interviews. Using these findings, two additional questions were added to the semi-structured interview schedule relating to participants' experience with implementing QI initiatives and occupation/role within the organization. The interpretation and use of early data has been shown to influence subsequent data gathering and analysis (Ambert et al., 1995). Finally, comments and explanations from free text boxes were copied into a Microsoft word document, then downloaded into QSR version 8.0 as a source of data for coding in step two.

Interviews

Immediately following each interview audiotapes were transcribed into a Microsoft word document. As the principal researcher, I undertook transcriptions of all interviews to enhance accuracy of words and sentences (Bailey, 2007). Participants were then asked to verify their transcription for accuracy and confidentiality purposes. One participant made minor changes to spelling but there were no changes

to content. No other participants offered any changes to their transcripts and all gave permission for the transcription contents in their entirety to be used in the research. Transcripts were imported into the QSR NVIVO software.

Step 2: Coding

For all sources – free text and interview - coding was the second step in the data analysis process. Described by Walker and Myrick (2006), the process of coding involves a breaking down of data, comparison and placing into categories. Similar data were then placed in similar nodes[3] and different data created new dimensions. Thus the coding process was an iterative, inductive, yet reductive process that organized checklist and interview data and helped with the development of dimensions, relationships and themes. Considerable time was spent in this study examining, interpreting and conceptualizing relationships as recommended by Bringer, Johnston, and Brackenridge (2004). There were three key phases undertaken to facilitate the process.

Phase One

At the outset of data analysis I used NVIVO to elicit word count frequency to identify recurring words from both checklist comments and interviews. This analysis is presented in Figure 1 and provided some initial ideas on coding nodes.

[3]Referred to as dimensions in this study

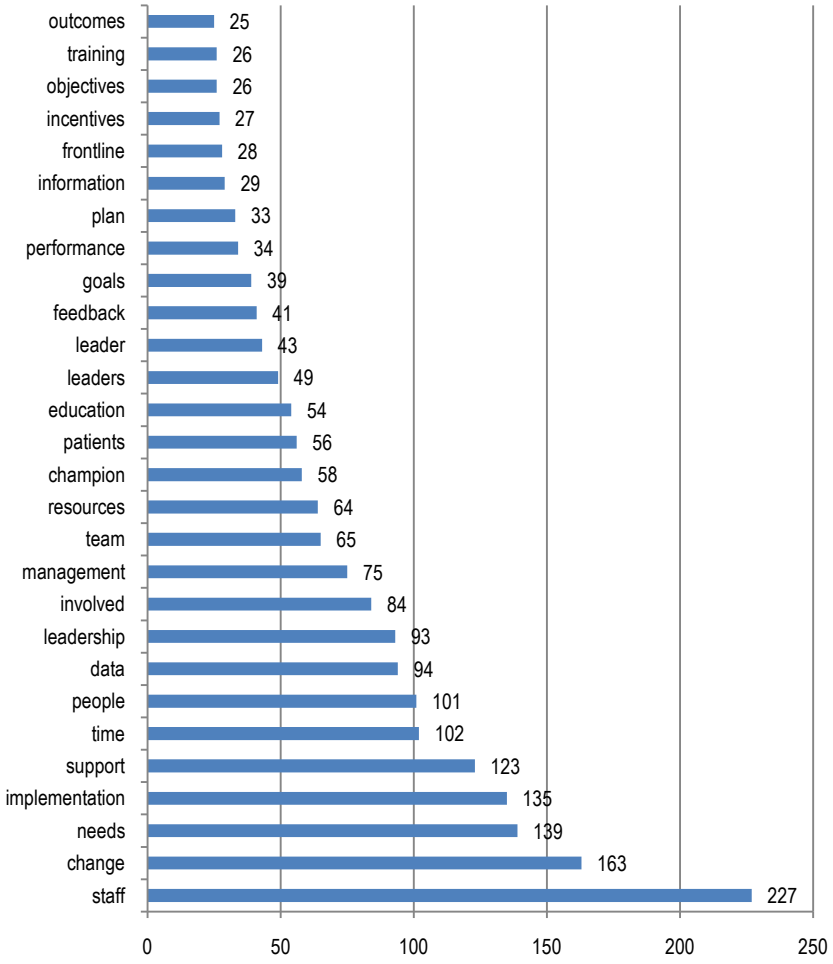

Figure 1. Results of NVIVO query to identify words most frequently used in checklists and interviews.

Phase Two

Using information obtained from the word count query, an iterative process of constant comparison, coding/recoding and interpretation was performed. The modeling feature of NVIVO captured early iterations of concepts and relationships in both dynamic and static forms which enabled the researcher to follow the progression of coding and recoding using both visual representation and journal formats. An example of the iterative coding process is found in Appendix 3.

Phase Three

The final phase of coding was an exploration of reference frequency and the sources from where references originated. This was generated using the frequency counts on the node pages of NVIVO which were then exported into Microsoft Excel spreadsheet chart builder. This was felt to be important to determine whether dimensions reflected all or the majority of participants' views or indeed, whether the concept was being espoused by only one source. Frequency of references and sources are presented in Figure 2. There was a maximum of 11 sources from which data were derived (five checklist comment documents and six transcribed interviews). This provided an interesting cross check to the word count presented in Figure 1.

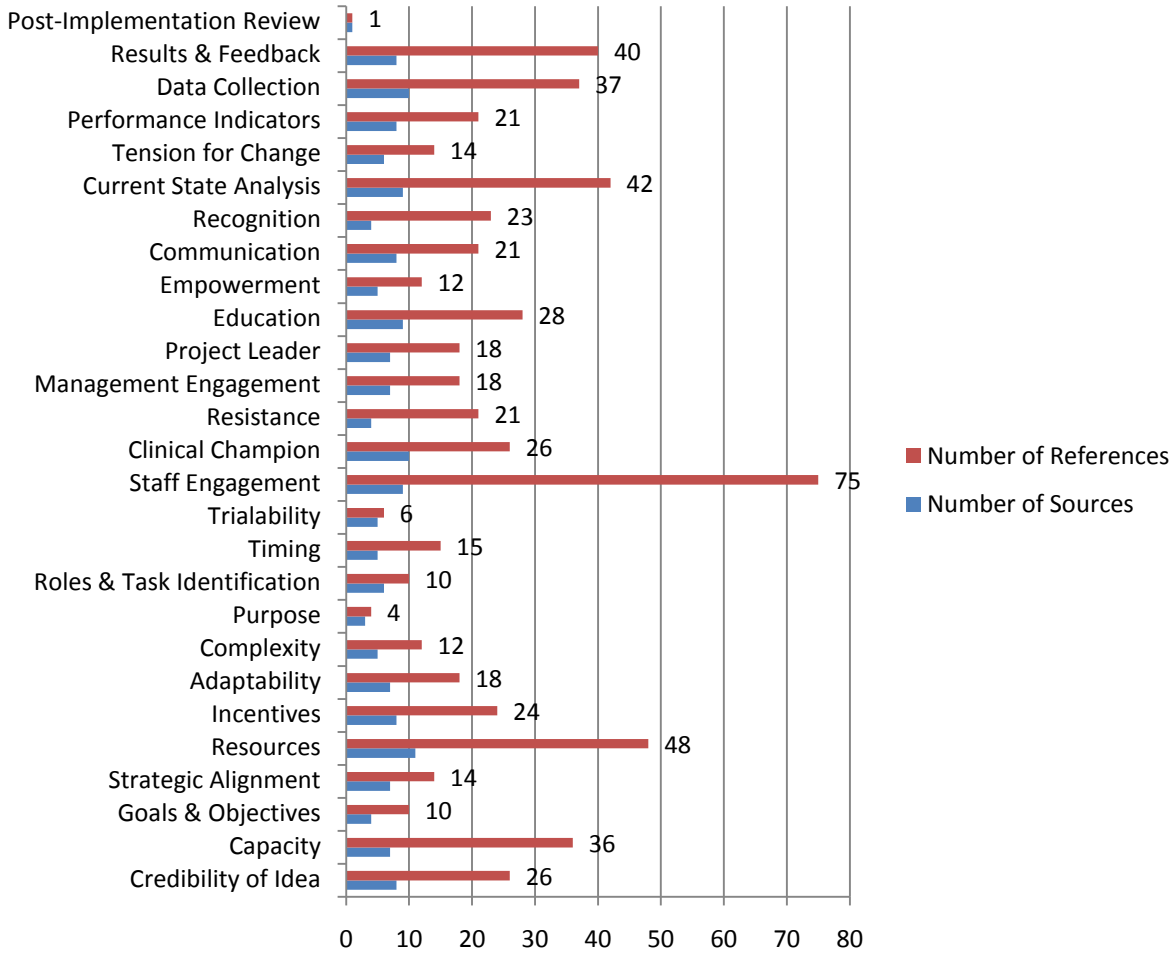

Figure 2. Numbers of references and sources for study dimensions.

Data Quality

Credibility, transferability, dependability and confirmability are all reported to influence the trustworthiness of research (Thomas et al., 2005). A variety of techniques were employed in this study to provide evidence of research competency. To ensure credibility, I used rich and thick descriptions, peer debriefing, triangulation of data and prolonged engagement. The following heading describes them in the context of the study.

Rich and Thick Description

A rich and thick description of the setting was elicited from participants over the course of the interviews which was subsequently coded. This provided the information to describe in detail the complex and extensive setting in which this study occurred. A description of participants afforded an understanding of their experience with the issue of enquiry as well as their role and rank within the healthcare organization.

Peer Debriefing

I met with my supervisor frequently over the course of the data analysis. Progress was presented using dynamic models of the iterative stages of coding. My supervisor questioned both names of categories and assignment of data to categories. This ensured that by the time the final model emerged, nine iterations of coding and recoding had been challenged and explained, with adjustments being made as appropriate.

Triangulation of Data

Three data collection methods provided data for analysis: quantitative perceived ratings, checklist text boxes and interviews. Triangulation of data allowed for constant cross-checking to support the conclusions being formed.

Prolonged Engagement

Interviews lasted between 70 to 90 minutes. This enabled the researcher and participant to get to know each other and talk at length. The depth and quality of data obtained from the interviews provided candid, frank and at times, intimate information relating to personal experiences. My professional involvement with the emergency services program also contributed to an increased familiarity with participants.

Electronic Data Audit Trail

To increase dependability, I maintained a detailed and progressive journal documenting the data analysis process. The journal tracked my reflections on why I changed category names or relationships. The modelling feature in NVIVO, in both static and dynamic forms, enhanced a visual understanding of which codes had been created, recoded or eliminated during the course of the analysis. The use of a semi-structured interview schedule also increased the dependability of this study as it provided some consistency in eliciting data.

Reporting discrepant or negative information

Although prepared for negative case checking during our regular peer debriefing meetings, there was no presenting information that ran counter to themes.

Researcher Bias

Finally, for the confirmability of results, it is natural that I identify my personal values, assumptions and biases at the outset of this study. As articulated by Corbin and Strauss (2008, p. 34), "background, knowledge and experience not only enable us to be more sensitive to concepts in data, they also enable us to see connections between concepts." Thus I perceive my contributions as valuable to this interpretive enquiry. My perceptions of implementation in healthcare have been shaped by thirteen years experience as a bedside nurse in critical care/seniors health and a further ten years in the field of occupational health and safety and, quality and patient safety in the acute care setting. Arising from my grass roots employment, I have experienced first hand the challenges associated with implementing new clinical protocols and other QI initiatives. In addition to bedside nursing, I have held several supervisor positions with responsibilities for designing, planning and implementing new QI initiatives, successfully achieving sustainable practice. Most recently I have experienced the regionalization of healthcare in Western Canada that I believe, has resulted in the decentralization of service administration to a program level of responsibility. Whereas previously I worked in a hospital that was run by senior administrators, I now work in a diverse and complex healthcare system managed by program and regional quality councils in which frontline staff play a key role in decision-making.

I believe that having an understanding of context through my healthcare experience enhances my awareness and knowledge to the highs and lows associated with implementation in the healthcare setting. With this experience, I bring knowledge and sensitivity to the study which will influence interpretation of the data as I create categories and allow themes to emerge. Corbin and Strauss (2008, p.304) suggested that "having a sensitivity for the topic, participants and research enables the researcher to step into the shoes of the participants and feel at a gut level. Otherwise, you lose some of the richness and depth of the data." As experience also relates to competency in qualitative research which subsequently enhances data quality, I successfully completed a graduate course in qualitative analysis. This helped to hone my

interview techniques as well as increase substantially my familiarity and competence with using qualitative data analysis software.

Chapter Four: Results

Participants identified a number of features that, in their experience, affected implementation of QI initiatives in the ED setting (research question 1). Using the checklist of factors based on the OCM framework participants commented on the fit between the factors and the context of QI implementation in the ED (research question 2). Participants also provided data relating to the use of an implementation audit checklist as an intervention tool (research question 3). These data were coded into primary and secondary dimensions which were then categorized into five themes: (1) creating a climate of implementation feasibility; (2) creating a climate of focus and flexibility in planning; (3) creating a culture of inclusiveness through partnerships; (4) creating a climate that mandates evaluation; and, (5) intervening to enhance effective implementation. A summary of how each dimension was defined is located in Appendix 4**.**

Statements from the implementation audit checklist were also coded under the dimensions and themes then tabulated along with participants' perceived value of each statement. These tables are referenced throughout the results section of this thesis.

Table 3

Summary of Themes and Dimensions

Theme	Title	Primary (Secondary) Dimensions
1	Creating a Climate of Implementation Feasibility	Credibility of Idea, Capacity, Goals and Objectives (Strategic Alignment), Resources (Information Management/Information Technology, Funding, Human Resources, Education, Equipment), Incentives.
2	Creating a Climate of Focus and Flexibility in Planning	Adaptability, Complexity (Purpose), Roles and Task Identification, Timing, Testability.
3	Creating a Culture of Inclusiveness through Partnerships	Engagement (Staff, Management), Education, Empowerment, Communication, Recognition.
4	Creating a Climate that Mandates Evaluation	Current State Analysis (Tension for Change), Performance Indicators, Data Collection, Results and Feedback, Post-Implementation Review.
5	Intervening to Enhance Effective Implementation	Context, Application (Strategic Planning, Brainstorming and Planning, Auditing to Assess Readiness), Usership, Design.

Theme 1: Creating a Climate of Implementation Feasibility

Data reported in the first theme - *creating a climate of implementation feasibility* – captures participants' views on features relating to the implementation process that assisted in moving an idea forward from conception to reality in the ED. Recurring features were identified and categorized into five dimensions including: (a) credibility of idea; (b) capacity; (c) goals and objectives (strategic alignment as a secondary dimension); (d) resources (IM/IT, funding, human resources, equipment as secondary dimensions); and, (e) incentives (See Figure 3).

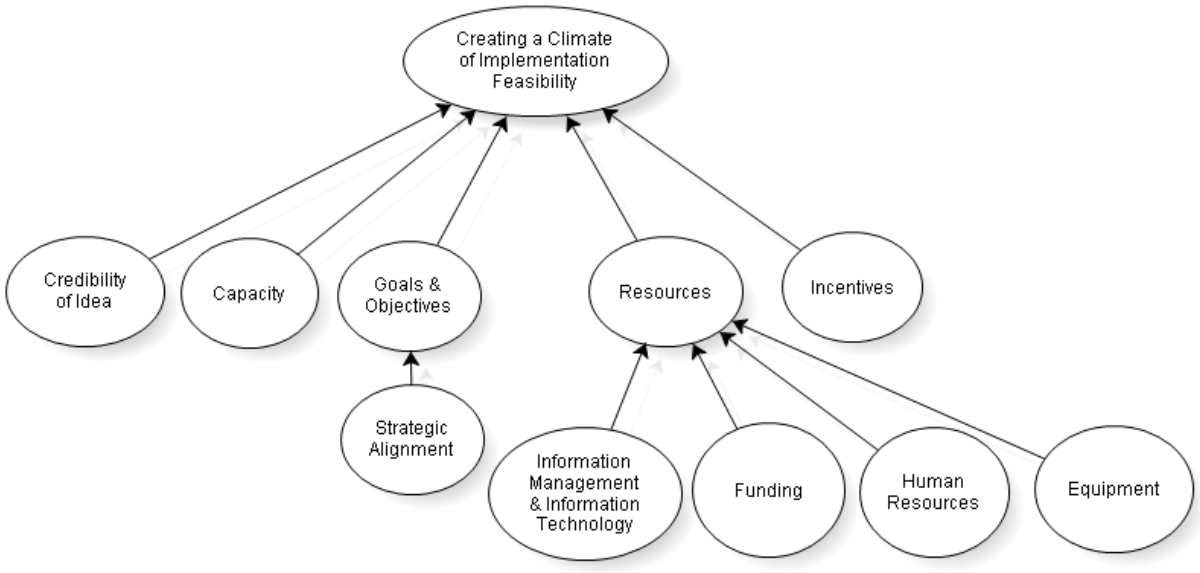

Figure 3. NVIVO model of theme 1: Creating a climate of implementation feasibility

Participants reported that when an idea was first put forward in the workplace, its *credibility* was reviewed with respect to the quality of supporting evidence. Data sources in this study converged to report that national standards and evidence-based practice influenced credibility of the idea. Information on whether the idea originated from within or external to the organization was also discussed as noted in the following participants' statements: "It is important for staff to know the ideas for this protocol came

from national best practice recommendations" (CL-105); and, "The key is that the ideas for the protocol be based on good solid evidence from multiple sites then it doesn't matter where the idea for the protocol per se comes from" (CL-104). While some participants reported that the source of the idea was not important, it was argued that external sources of information have more credibility. However, the value associated with source of idea was not perceived as being critical (See Table 4).

Complimentary to the discussion on credibility were three additional features that the data described as assisting decision-making on whether it was feasible to implement the new QI idea. These data were categorized in three dimensions under theme one: capacity, goals and objectives, and resources. In this study *capacity* was operationally defined as 'volume of work; the ability to receive and absorb new information'. Participants described capacity issues as a composite of coping with the dynamic nature of the emergency setting as well as individual clinician's capacity to embrace new initiatives as reflected in the following statements:

> Staff that work in the emergency department are given a large volume of information because of the diversity of the population we serve…. There are always competing demands in the emergency department. The emergency department is the pinnacle of nursing. All specialties that we have to look after – other units just focus on one….. The amount of new information that emergency RNs have to take on is huge. So not just only do emergency staff have to have a broad knowledge base to treat the many types of conditions that patients present with, this is intensified by competing demands of other elements in the healthcare system (I-105).

> So, if you think of a circle and you have the ministry coming with initiatives, and you have the CEO coming with initiatives, the coroner's report coming with initiatives, and you have frontline staff coming with initiatives, and then you have research with other best practices….(I-103).

Table 4

Coding of Checklist Statements under Theme 1: Creating a Climate of Implementation Feasibility

Checklist Question	Checklist Statement	Frequency Count of 'Critical' Rating	Frequency Count of 'Helpful' Rating	Frequency Count of 'Not Helpful' Rating	Alignment with Primary Dimension
4c	Leaders have time and resources to support the Initiative.	5	1	0	Resources & Capacity
6a	Leaders have committed money to support both implementation and problem solving and/or there is external funding available to support.	5	1	0	Resources
5c	Middle management has time and resources to support the initiative.	4	2	0	Resources & Capacity
7d	Staffing levels support the change(s) arising from the sepsis initiative.	3	3	0	Resources
5b	Implementation of the sepsis initiative helps meet middle management goals and objectives.	3	2	1	Goals & Objectives
3c	Leadership has set high performance expectations.	3	2	1	Goals & Objectives
7b	Organizational structure supports the change(s) arising from the sepsis initiative.	3	2	1	Resources
7c	Incentives are available to support the change(s) arising from the sepsis initiative.	1	5	0	Incentives

Checklist Question	Checklist Statement	Frequency Count of 'Critical' Rating	Frequency Count of 'Helpful' Rating	Frequency Count of 'Not Helpful' Rating	Alignment with Primary Dimension
4b	Implementation of the sepsis initiative helps meet leadership goals and objectives.	1	4	1	Goals & Objectives
1a	Key ideas behind the sepsis protocol came from outside your organization.	0	4	2	Credibility of Idea

Clearly the data identified that multiple stakeholders influenced the ED and the issue of 'who decides' and 'how much'. This issue was widely referenced in multiple data sources, examples of which are provided in the following statements: "Too many changes at once and people can't take it in" (CL-104) and "If you don't have the capacity to do a proper improvement project why would you waste resources on doing it half way" (I-106). The following paragraph captured in essence, the underpinning of the data coded under capacity:

> It's like a funnel. So even if you have ten project people and each of them is doing five projects, you still have one group that is receiving the change. And the receptacle is this one same pot of people…we sometimes fail to allow staff to embed one change in their practice so it becomes second nature before we start giving them two, three, four, five more changes then we wonder why they haven't taken up the initiatives to the degree that we think they should have (I-103).

Closely aligned with participants' views on capacity was data coded under *goals and objectives*. Participants rated that the value of aligning new QI initiatives with middle and senior leaderships' goals as helpful but not critical. In one instance it was reported as not being at all important (see Table 4). Data obtained during interviews provided rationale for these ratings: "The ultimate goal is to improve patient

outcomes: This should be the goal for all of us" (I-105). Similarly, a checklist comment iterated: "Everyone should be striving for excellence in patient care. This should be universal" (CL104). In an interview, a participant explained their viewpoint on goals:

> My primary goal has always been more from us to the patient rather than from us upwards…. I'm making the assumption that their goals are around patient care, and therefore it would be important that these are met (CL-101).

Participants noted that their goals were more in line with clinical expectations rather than wider system goals established by leadership. The desire to monitor non-tangible goals was also identified in the data, as described in the statement below:

> I would have set expectation goals of such and such a time to care level such and such … and what we hoped to achieve was greater department cohesion, less conflict between doctor and nurses….So like for streaming, a lot of our success goals were around conflict within the department. The interdisciplinary relationships, department cohesion stuff (I-104).

Although department level goals were identified as the main driver for participants, respondents did acknowledge that leadership goals for the organization were established by the Provincial government in the form of performance indicators. This was reported as creating some tension when it came to deciding what to work on:

> So who gets to decide what we're working on…..they are looking at the indicators that they want to look at which are the indicators that the government set so that is top down stuff. It's very different from what the average clinician understands as priorities (I-106).

The third dimension relating to implementation feasibility was *resources*, which was identified as a stand-alone feature as well as being integral to discussion on capacity and goals and objectives. Resources were described as having people to do the job (human resources), funding, information management and information technology (IM/IT) systems to support initiatives and appropriate equipment. Data relating to resources was referenced from all sources and Figure 2 identified it as the second most frequently referenced dimension in the study.

Data indicated that there was a multitude of resources required including: (a) funding for patient information pamphlets, staff education, physician education, equipment and drugs for new clinical protocols; (b) human resources including IM/ IT experts, clerical, statisticians; (c) auditing support; (d) leadership support; (e) payroll; (f) printing services; and, (g) communications. The consequences of not having sufficient resources were clearly captured in two participants' reflections:

> That affects staff and the people having to direct the project. Knowing that they actually don't have the resources to do the job….So then what happens to their sense of satisfaction, to frontline staff sense of satisfaction and then the wall goes up and people say "I'm not going to do it", not one more change (I-103).

> Often we have ideas that will improve care for our patients but we are often gung-ho and a few weeks later, the wheels fall off because we don't have resources to carry on. It comes down to making the initiative sustainable (I-102).

Although data were weighted more heavily on a lack of resources, two strategies were suggested that could assist clinicians when challenged with resource issues and multiple change initiatives:

> So actually really critically look at what changes we are implementing and is there a way to streamline them, what does this mean, what are the redundancies that we could actually take out because we have done it (I-103).

> It's important to look outside of the organization to bring in evidence-based practice. It's important to share the information as it can reduce duplication of effort when resources are so stretched (I-105).

The issue of resources was summarized by a participant: "Resources is huge if you want to implement well. Resources is time, funding, people, this is like the infrastructure to support implementation" (I-102).

The final dimension in theme one was *incentives*, which was operationally defined as 'a motive or incitement to action'. Data indicated that the use of incentives held different views. The most referenced perspective related to improved patient outcomes which participants described as being the incentive behind getting on board with a new QI initiative. With respect to using incentives to motivate nurses to participate, one participant expressed concerns stating:

> It could even become somewhat of an ethical question…talking about delivering better patient care… it's within our standards of practice so its implicit in what we do, delivering better patient care, so by offering incentives, does that take some of the professionalism out of it? Generally the things that drives whether the change is going to work is whether the change is in alignment with the values of the staff so, to me that's the incentive and if that is inherently in the project i.e., sepsis protocol: if it's important to staff to capture sepsis patients early so their outcomes are improved then that is more of an incentive….. more so than a box of chocolates (I-101).

This perspective was supported within other data sources, clearly identifying enhanced patient outcomes and increased access to patient care as the incentive to action. During an interview, a

participant described helping patients as “a moral incentive” (I-104). However, one data source provided a caveat to this statement:

> You can rely on that to a degree but over time it just starts to eat into people’s lives too much and I don’t mean myself personally, I mean the whole team starts to feel like you are committing a huge amount (I-104).

The use of financial incentives was noted as having potential to incite action:

> Depending on how much incentive, we can identify every sepsis patient and treat them with a certain protocol and our organization would give us money for each patient then we could hire another practitioner. You would probably get more buy in. So the incentive coming back into the department to follow evidence-based practice (I-102).

In a similar vein, another participant questioned whether there was any way healthcare administration could “come in to create a system whereby programs can earn incentives for exceeding patient care” (I-102). This was explained as a pay-for-performance scheme set up by government which involved moving patients out of the department and into a bed more quickly then being rewarded with money into the department. If, however, the department did not achieve the target turnaround time, then the department would owe government, thus creating an incentive for the organization as a whole. With this in mind, one participant remarked: “you could attach incentives to anything to make hospitals more efficient or less efficient or whatever… that’s at the organizational level and Government level” (I-102).

Discussion also provided data relating to the role of financial incentives in the context of personal financial gain, specifically to physicians. Evident in interview data was that government incentive schemes to reward physicians were perceived as detrimental and insulting:

> I think we are super cheap and I think the Government made a huge mistake here right? They thought physicians were all about money and guess what they started to pay them MOCAP to be on call but they kind of insulted them actually because they said some of them it worth more money for some of them to be on call than others to be on call. And you know what… biggest mistake. And you know what their biggest mistake was? They thought it was about money and it never was. It never was and it's been a disaster. It is a disaster. And they are stuck with it. And it has really changed a lot of the language and the talk to be about money when that was never the issue and it was never going to be so it's a bottomless pit because there will never be enough because that's not the issue (I-104).

Finally, participants briefly acknowledged the role of 'regulatory incentives' that existed in the United States whereby healthcare facilities lost accreditation if benchmarks were not met.

Theme 2: Creating a Climate of Focus and Flexibility in Planning

Theme 2 - *creating a climate of focus and flexibility in planning* - involved research data that appeared to be more task oriented than other themes in this study. Data were identified and categorized into five primary and one secondary dimensions including: (a) adaptability; (b) complexity (purpose as a secondary dimension); (c) roles and task identification; (d) timing; and, (e) testability. Refer to Figure 4.

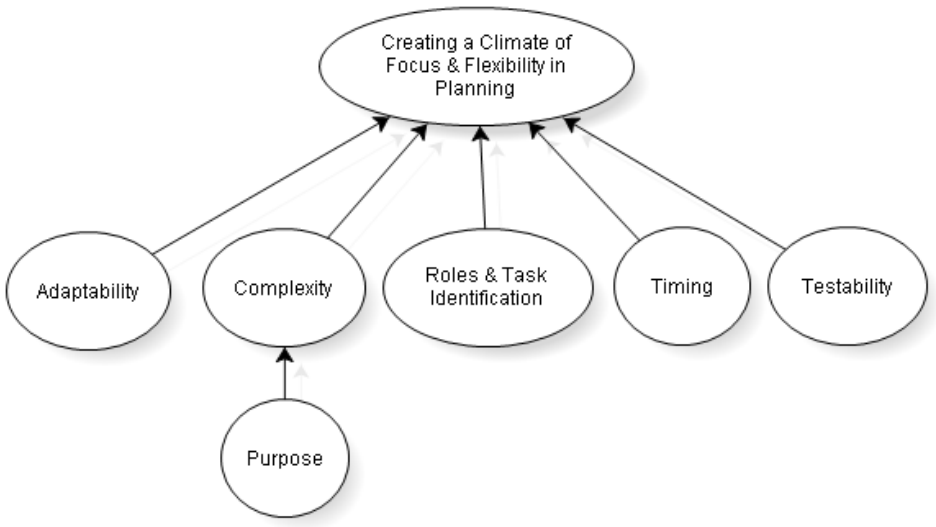

Figure 4. NVIVO model of theme 2: Creating a climate of focus and flexibility in planning

Starting with a focus on the *adaptability*, participants described the critical nature of ensuring the QI initiative was designed to meet local needs, particularly if the idea had originated from outside the organization (see Table 5). Adaptability was operationally defined as 'the ability to adapt to new conditions or settings'. Participants described various methods employed during implementation of the sepsis protocol as they adapted a national standard-based clinical protocol to meet the local needs of their emergency departments. These included familiar use of language and formatting of documents as well as flexibility in messaging. The second dimension in theme two was data coded relating to the *complexity* of an initiative. A description of QI initiative complexity was provided during an interview:

> It can be something very minor such as fields that you put in a computer screen, well I think it's minor, and it can be something major like a new procedure, a new protocol, a new drug. It can be a huge magnitude that you have just moved a department into a whole new space (I-103).

Emerging from interview data, it was evident that simplicity is desirable whenever possible. When discussing experiences relating to implementation of the sepsis protocol trigger tool, one participant noted: "Other initiatives have been much more complex and involved job changes, but the simpler things can be, the better" (I-101). This perspective was shared by others who described the effectiveness of simplicity: "The sepsis tool that we are using works well and is simple; the implementation of any tool needs to be clear, concise and meaningful" (CL-105) and "The more simplified, the better. Pulling out three pearls that staff should remember and keeping them simple helps with retention of the information" (CL-101). Elements reported to determine complexity included: (a) the amount of collaboration required across programs; (b) the degree of involvement required at multiple levels of the organization; (c) the number of job changes; and, (d) the number of tasks integral to moving the initiative from an idea to routine practice. Support for the critical need to identify the issue and clarify the *purpose* as a step in determining the complexity was provided in the following statement: "From the patient perspective, why are we doing this, what do we need to give the patients; truly what it is that we see as the reason that we are doing this" (I-103).

Closely associated with data on complexity was the information coded under the third dimension *identification of roles and tasks.* The following statement captures in essence, the need to identify individuals' roles and tasks: "If someone brings a project to you, you have to really clarify with everyone who is doing what" (I-102). Furthermore, data indicated that: "It's an equal playing field in that everyone has a role and has equal importance, roles and responsibilities are clearly identified" (I-103). Clarification of roles was also associated with project success. Interview data described that: "Having someone accountable for the progress of a project will increase the probability of success" (I-105).

Table 5

Coding of Checklist Statements under Theme 2: Creating a Climate of Focus and Flexibility in Planning

Checklist Question	Implementation Statement	Frequency Count of 'Critical' Rating	Frequency Count of 'Helpful' Rating	Frequency Count of 'Not Helpful' Rating	Alignment with Primary Dimension
3b	Issue has been clearly defined and needs/tasks identified.	6	0	0	Complexity
13	Proposed sepsis initiative can (without hurting effectiveness) be easily modified to make it more appropriate for your ED setting.	6	0	0	Adaptability
1a	If key ideas came from outside your organization, they have been tailored to meet your organization's needs.	5	1	0	Adaptability
14a	Implementation plan is simple and staff understand it.	5	1	0	Complexity
14c	Small tests of change or a pilot test(s) are used.	4	2	0	Testability
14b	Implementation schedule and task assignment are detailed and clear.	3	3	0	Complexity
15a	If job changes are required, they are few and clear.	2	4	0	Complexity
12a	Staff and/or patients feel that it has many more advantages than disadvantages and that it meets their needs well.	1	5	0	Adaptability & Complexity

Timing, the fourth dimension of theme two, was described by participants with two perspectives. Data predominately reported on timing in the context of when and how often to evaluate during the course of implementing the QI initiative from the inception of the idea to it becoming embedded into routine practice. "We need to plan for data collection over the next 24 months; this is the stabilization period" (I-103). This data was consistent with others who described their experiences and thoughts on data collection during interviews:

> There needs to be a more detailed implementation plan – the schedule must include evaluation at three, six, nine and 12-months then depending on whether meeting/exceeding standards, less frequently audits thereafter. Eventually we just need do random audits for maintenance (I-105).

> I think it's between one to two years that you lose the glow. Now once you have established your process and it has become part of your culture then what you need is enforcement and enforcement can be considerably less frequent (I-104).

An alternate lens on timing was offered by a participant while describing a personal experience with the roll-out of an e-health initiative in an emergency department:

> Some people would say that implementation starts the moment that you flip the switch i.e., go live. For me, implementation actually starts two weeks out from that. And it's that final preparation (I-103).

Related to discussion on the notion of 'go live' was the issue of *testability* – the final dimension in theme two. Testability was operationally defined as 'the process of testing the ability, quality and performance of a QI initiative before reaching a final decision about whether to spread its use to other areas or abort the initiative all together.' Described in the checklist as 'small tests of change or pilot test(s) are used', four out of the six participants identified this dimension as critical, while the other two

rated it as helpful (see Table 5). In support of the decision to rate this statement as critical, a participant shared the rationale behind the rating:

> The plan-do-study-act is so important. You find out where the gaps or flaws in the system are before spreading to the whole department or island. If you don't test something before spreading, there is a strong likelihood that it could fail. And that's not good for the patient and it can be demoralizing for the staff (I-102).

Data also described the need to be continuously evaluating the QI initiative. In the context of implementing the sepsis protocol, one participant reflected: "Some things just need to be started then reviewed and adjusted while in use. At least one audit to show benefit or lack there of has been very useful and a huge motivator" (CL-105).

Theme 3: Creating a Culture of Inclusiveness through Partnerships

Data categorized under theme 3 - c*reating a culture of inclusiveness through partnerships* - was perceived central to the implementation of a QI initiative and was composed of five primary and five secondary dimensions. They were as follows: (a) engagement (secondary dimensions: staff, clinical champions, resistance, management, project leader); (b) education; (c) empowerment; (d) communication; and, (e) recognition. Refer to Figure 5.

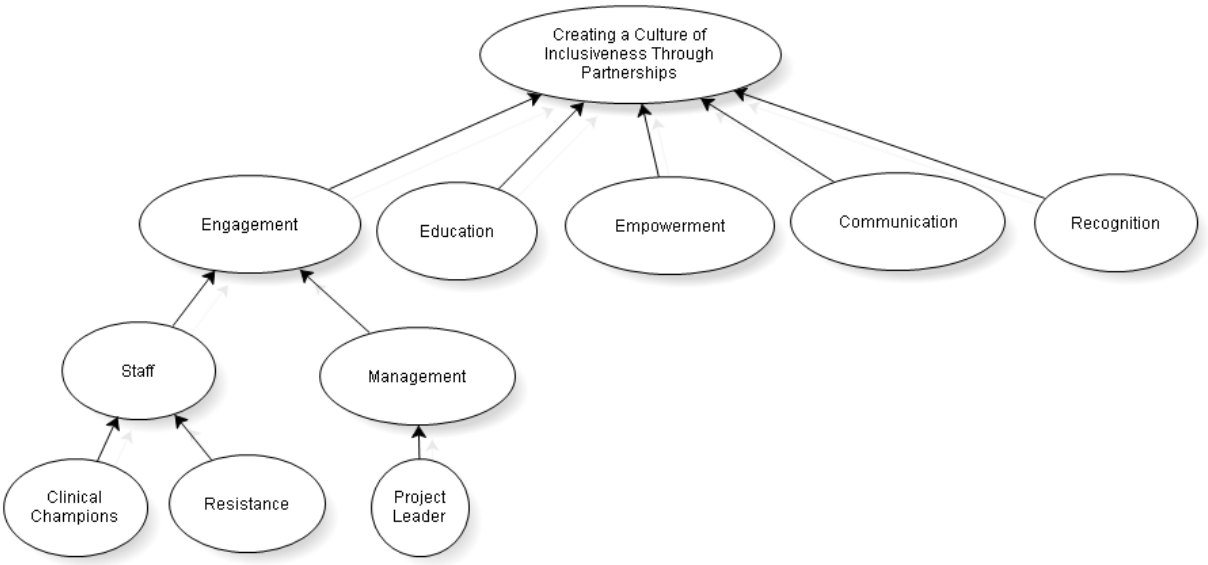

Figure 5. NVIVO model of theme 3: Creating a culture of inclusiveness through partnerships

This was evidenced by the high number of critical ratings assigned to checklist statements coded to theme three as well as high frequency of references to each dimension (see Table 6). Refer to Appendix 5 for a full tabulation of perceived values for each checklist statement. The predominant focus of data related to the involvement of the right people with the right skills at the right time when implementing a new QI initiative. This was coded to the first dimension – *engagement* - in the first secondary dimension – *staff*. As described by one participant: "If you are doing an initiative that involves big change it's essential

to have all the key staff there otherwise it won't get going, you know, having the key stakeholders there from the start" (I-102).

Table 6

Coding of Checklist Statements under Theme 3: Creating a Culture of Inclusiveness through Partnerships

Checklist Question	Implementation Statement	Frequency Count of 'Critical' Rating	Frequency Count of 'Helpful' Rating	Frequency Count of 'Not Helpful' Rating	Alignment with Primary Dimension
7a	Leader roles support the change(s) arising from the sepsis initiative.	5	1	0	Engaging Management
15c	Excellent training and education materials have been developed.	5	1	0	Education
15d	Education and training sessions are available.	5	1	0	Education
8b	Clinical champion(s) is empowered and is respected by colleagues.	5	1	0	Empowerment
8a	Clinical champion(s) is committed to making the sepsis initiative a success.	5	1	0	Engaging Staff
5a	Middle management is regularly involved and/or informed.	4	2	0	Engaging Management
8c	Clinical champion(s) respects values of staff.	4	2	0	Engaging Staff
9b	Staff leaders have been involved and believe that steps have been taken to meet most staff needs.	4	2	0	Engaging Staff

Checklist Question	Implementation Statement	Frequency Count of 'Critical' Rating	Frequency Count of 'Helpful' Rating	Frequency Count of 'Not Helpful' Rating	Alignment with Primary Dimension
15b	Staff have needed skills to implement sepsis protocol.	4	2	0	Education
9a	Healthcare provider(s) involved with the sepsis initiative know(s) staff needs and have taken steps to meet most staff needs.	4	2	0	Education
3a	Leadership has assigned a change agent.	3	3	0	Engaging Management
4a	Leadership are regularly involved and/or informed.	3	3	0	Engaging Management
9c	Most staff will support the sepsis initiative.	3	3	0	Engaging Staff
12a	Staff and/or patients clearly understand how the sepsis initiative addresses the problems or needs.	1	5	0	Education

The value of staff involvement was described as:

> If staff is involved in the development and implementation of the trigger tool – they can give feedback about what works and what doesn't work. After roll-out, the tool could be easily changed if a staff member had a valid suggestion on how it could be changed….. it helps create a culture of the 'opportunity to be involved' culture (CL-105).

'Key staff' was described by participants as individuals impacted by the new initiative. In the context of implementation in the ED, participants described the critical importance of involving ED physicians, nurses, unit aides and clerking, management, support crew such as quality assurance associates, statisticians and information management/information technology experts, and staff from medical imaging and labs. In addition to specific disciplines and programs, data also indicated the necessity of including staff that represented the diverse geographic emergency settings including rural, community and urban sites. Risks were identified when there was no staff involvement: "We have two external protocols here for asthma and they have very poor use profiles partly because the staff were not involved in their development" (I-104). Several suggestions were offered to enhance staff engagement including the influence of clinical staff who champion new ideas. The following statements capture the characteristics of a clinical champion:

> People can get a bee in their bonnet and off they go. They want to work on it and they'll push and push and that's a champion….. Some people keep tilting their windmills and they can get people to follow. They are persuasive or they have a good concept and people follow (I-102).

> A clinical champion to me is someone who is passionate, personal and entirely patient-driven and for what every protocol that you are putting forward in medicine, you have to have that. You have to have somebody who speaks passionately about how this is going to change our patients' lives (I-104).

Through the data, participants revealed that both physician and nursing champions were required who served as the go-to person in the unit to ask questions about the initiative. However, a caveat to a champion's participation was noted: "And in fact sometimes clinical champions at least from the physician side, are overly passionate on the subject and haven't got good objectivity" (I-104). Participants

were clear about the importance of having a team or project leader[4] as well clinical champions involved to provide objectivity. The project leader was identified as being a different individual from the clinical champion and was a member of the inter-disciplinary improvement team. "Coupled with the clinical advocate, the team leader makes the process happen" reported one participant. When describing characteristics of a team leader, participants noted that the leader was a decision-maker in the organization and often, a member of middle or senior management. Furthermore: "they just have to be an effective organizer, clearly defined goals, clearly move the goals forward and identify areas where you are slipping… they need to have enough power to move forward the goals that you do have" (I-104).

Participants identified the need for project leaders to acknowledge naysayers who exercised resistance to the smooth implementation of the QI initiative. As reported: "No matter how much planning you do, most initiatives and changes are met with a degree of scepticism, even if people believe it will likely be positive" (CL-101) and "In any new initiative there will be a component of staff who do not support the change" (CL-103). Naysayers were described as "individuals who had the attitude that they were not going to be part of the project; who turned up at the departmental meetings and sat there with their arms crossed and perhaps made some disparaging remarks" (I-103). However, rather than labelling these individuals as problem employees, one participant described their experience during implementation in the emergency department of a complex e-health initiative:

> One of the pieces we did to engage them was to get one of them from each site to what we call, drive the bus. So, sit in the driver seat ….. giving them responsibility……they actually sold to their fellow negative nellies and you would hear things like 'I could do it , you can do it' (I-103).

[4] Team leader and project leader are used interchangeably in this study.

While it was reported that engaging the naysayers was more work up front for the project leader, they were critical team members as often they had a wealth of knowledge that could be tapped into. In the data there were suggestions that it was important to understand the reason underlying their negativity toward the initiative: *"*Maybe they have never felt that their contributions have been recognized" (I-103).However, the need to chaperone them was identified as they often had dominant personalities that could brow beat others. In addition to clinical champions and project leaders, data revealed an additional method of engaging staff was to provide supportive information with the QI initiative: "If you provide them with rationale and best practice, and the support to make changes, the natural reaction is to want to implement the improvements" (CL-101).

A third method emerging from the data of engaging staff was the provision and accessibility of education through which staff learnt about the background to and reasons for introducing the new initiative into their emergency practice. Participants reported that this increased the likelihood of staff becoming engaged and ultimately buying into the initiative. In addition to enhancing staff engagement, education was reported as the means by which staff learnt about the why, when and how of the initiative. An example of the importance of educating staff was described by a participant when discussing personal experience relating to implementation of a new clinical cardiac protocol:

> There has to be a sense that… to me it's like if the nurse is the first point of contact in a peripheral emergency department does not see the need for speed, and that time is muscle, then there would be nothing to drive them to deciding that this patient needs an ECG right now…. I don't know how to do an ECG…. I need to drop everything right now and do an ECG (I-106).

A mechanism of delivering education was also identified as an important consideration when engaging staff and physicians. Several strategies employed by participants included: (a) making available multiple formats including rounds and follow-up chart reviews; (b) conducting face-to-face teaching

during clinical in-services; (c) making accessible both formal and informal teaching sessions; (d) planning education well in advance and ensuring it was user-friendly; (e) establishing an environment that supported learning; and, (f) making available data that supported rationale for the introduction of the QI initiative as well as data to monitor progress during implementation. The impact of education was described as having a profound effect on staff as well as on patient outcomes:

> This not only had an impact on improved patient outcomes but also an impact on the healthcare provider as far as professional development and job satisfaction. This means providing continuing education, specialty education. It all leads to professional development. It also helps with retention (I-105).

Despite the magnitude of work undertaken to engage staff, participants noted that it was not always possible to have full staff engagement prior to implementing a new initiative. Although a majority was needed to make a successful change (CL-105) it was sometimes necessary to "go ahead with a change and show staff how it will work before you will get their support" (CL-101).

Data relating to engagement was not limited to staff. The value ratings of *engaging management* in the checklists varied between 'critical' and 'helpful.' Refer to Table 6. When prompted to explain their ratings, participants identified management as the vehicle to eliminate barriers and roadblocks that improvement teams encountered along the path of implementation, particularly with respect to resources. As noted by one participant: "You need to have executive support to make it a success down at the front line in terms of deployment of resources"(I-106). Another participant explained in more detail: "I think talking to middle management doesn't always get the ideas done, you have to go another level higher to get things done" (I-102). When management were involved, they were appreciated by the frontline staff: "Their support means all the more as we see how hard they work. Making time to attend our meetings highlights the importance of the protocol" (CL-104).

Emerging from the engagement process was the concept of improvement teams, also referred to as project teams. Participants described improvement teams as a group of interdisciplinary individuals (emergency physicians, nurses, registration clerks and unit aides) who represented emergency medicine as well as the diversity of specialities and geographic location in the health region. Expanding on the multidisciplinary nature of improvement teams, a participant added:

> Healthcare is so diverse beyond clinical training. There is so much technology that we can't all be experts…. I don't have the statistical background nor the inclination to do those sorts of things and you need that support because it gets more and more complicated every second and I don't understand it and I don't want to (I-104).

The next dimension categorized under the theme of creating a culture of inclusiveness through partnerships was *empowerment*. Empowerment was operationally defined as 'a process that gives staff and leadership autonomy, discretion and decision-making responsibility.' Data indicated that empowering members of an improvement team, particularly clinical champions and project leaders, was important in enhancing staff buy-in of a QI initiative (see Table 6):"It will likely be perceived as more of a top-down project if the leader doesn't feel empowered" (CL-101). Empowerment was also reported to increase credibility of the leaders.

The fourth dimension coded under theme 3 was *communication***.** Communication between members of an improvement team was identified as problematic: "I think the sepsis process has been fairly smooth but probably the part that needed most attention was communication between ourselves" (I-102). Similarly:

> That was the biggest problem with getting our little triage collaborative going… I couldn't get people together to have a pow-wow….. Communication is key and so that's a huge problem when you're dealing with salaried employees who don't come in on their time off (I-106).

The availability of team members to leave bedside care and attend planning meetings was referenced as a reason for communication difficulties. Changes in improvement team membership also played a key role in hindering effective and consistent communication. Establishing a clear communication plan than encompasses the full scope of implementation was identified as a means of ensuring good communication throughout the implementation period:

> I think communication is part of the implementation plan but it spans more than just the implementation. It is from conception to who you share your vision with, your ideas with, the implementation, to the post implementation because if you don't have key communication…. And even after, ok now you're in the stabilization mode, if you haven't established communication with more of your external partners, now we have issue resolution…. So if I haven't established good communication with other people, issues arising during stabilization mode do not get addressed (I-103).

The final dimension in theme 3 was *recognition* which was operationally defined as 'the acknowledgement of a service, achievement, ability, appreciation.' Recognition was described by participants as a simple gesture that recognized individuals' daily efforts and was handed-out by all levels of staff in the organization. As opposed to an incentive which was described more of a motivator to getting started, recognition was perceived as a more subtle gesture to be embedded into worklife routine:

> It can be as simple as at the end of one of your meetings saying thanks guys for your input because you know what, together we are really going to make a difference to patient care. So just a reminder of what and why we are doing it (I-103).

> Everyone defines it over the patient lived, I did a good thing today, we saved that guy, you know I did it better yesterday than I did the day before it was a good day at work, we did this myocardial infarction and it turned out wonderful. This is what these people want out of life (I-

104).

> I think praise from peers is common…I think that praise from patients is invaluable… I think that praise from your higher ups is very valuable and very rare (I-104).

Overall, data coded under theme three were rated highly (in perceived value) and referenced frequently in checklist comments and interviews indicating the importance of creating an inclusive culture when implementing new QI initiatives.

Theme 4: Creating a Climate that Mandates Evaluation

Creating a climate that mandates evaluation was the fourth theme that addressed the research question: Is there a fit between factors listed on the implementation audit checklist and the context of the ED? Theme four was categorized into five primary and one secondary dimension(s): (a) current state analysis (secondary dimension: tension for change); (b) performance indicators; (c) data collection; (d) results and feedback; and, (e) post-implementation review. See Figure 6. The underpinning of theme four was the role and handling of data as clearly articulated during an interview: "Data is really important, this is how you drive things especially when you are doing projects like sepsis, or any project that involves changing processes, you can drive with data" (I-102).

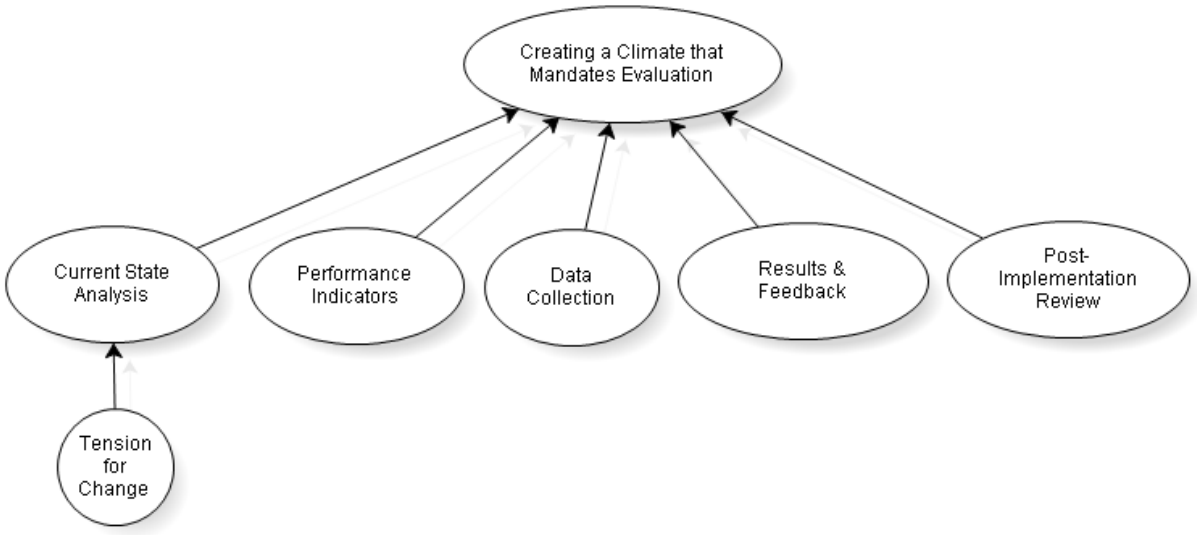

Figure 6. NVIVO model of theme 4: Creating a climate that mandates evaluation

The process of identifying, gathering and using data accounted for a substantive portion of information obtained during the study as evidenced by Figure 2.

Table 7

Coding of Checklist Statements under Theme 4: Creating a Climate that Mandates Evaluation

Checklist Question	Implementation Statement	Frequency Count of 'Critical' Rating	Frequency Count of 'Helpful' Rating	Frequency Count of 'Not Helpful' Rating	Alignment with Primary Dimension
16b	Performance data relating to new initiative is collected.	6	0	0	Data Collection
11c	Data is available on severity of sepsis problems/needs.	5	1	0	Current State Analysis
16a	A specific method exists to get honest staff and/or patient feedback, which is then, used to improve the sepsis initiative.	4	2	0	Results & Feedback
14c	Staff disagrees or dislikes the existing situation re: sepsis and believes change is essential the address the problem.	1	5	0	Tension for Change

Research data coded under *current state analysis* referred to an analytical process that established a flow map of current practice and gathered clinical baseline measures. Clarity on understanding flow maps was provided during an interview and is captured in the following statement:

> Current state analysis, patient flow... And we had mapped it out and then what we did at the workshop was spent a whole afternoon giving the documents to the staff and saying, doing a full review and this is how you read one of these so when you take it apart step by step, have we actually correctly identified what it is you do (I-103).

The importance of gathering clinical baseline measures as an integral feature of implementation preparation was articulated by a participant during an interview: "This is an evaluation of the problem to be addressed. If you don't know how bad the problem is, how do you know if the initiative designed to improve is being effective" (I-105). The criticality of these statements was supported further by the perceived value ratings in the implementation audit checklist (See Table 7). A consequence of a current state analysis was its capacity to create *tension for change*. As described by the following participant:

> If people are going to embark on doing some work, you need to demonstrate the need for the work to be done…..there has to be that tension or need for change, understanding that there is a need for change (I-106).

The second dimension categorized in theme four was *performance indicators* that could be used during current state analysis and in future performance evaluations. National-based standards were frequently referenced as the primary source from which clinical performance indicators were derived. Relating to the sepsis protocol, participants identified the following clinical indicators: (a) time to being seen by an emergency physician; (b) identification at triage with the sepsis tool; (c) time to antibiotic; (d) time to intravenous fluids; and, (e) discharge outcomes. In addition to clinical data, participants identified performance indicators that were harder to measure as described in the following statement:

> Embarking on the new initiative I would have set expectation goals of such and such a time to care level such and such … We knew that that wasn't going to be as relevant for our setting and what we hoped to achieve was greater department cohesion, less conflict between doctor and nurses. We did hope to see improved flow for our middle patients – our level three patients and we set a time that we wanted to see them within an hour. Those were our expectations for the process. So some of those are measurable easily and some are more airy fairy...The interdisciplinary relationships, department cohesion stuff. It's very hard to measure those (I-104).

Having identified indicators of interest, the third dimension, *data collection*, reported on two topics: (a) methods employed to collect data; and, (b) frequency of data collection. Clinical audits of patient charts were identified as the common method of obtaining clinical data. However, this task was perceived as time consuming and was often constrained due to a lack of available human resources. Research data indicated this issue was not limited to the organization of study:

> The single most significant piece of Stuart's[5] talk on sepsis, the biggest ah-ha moment for me was that they do not have the technology that you would expect and we have to do chart reviews and there is no way that any kind of electronic system is going to allow you to collect that kind of data and especially if you want to be nimble (I-106).

Questionnaires were also reported by participants as a useful method to obtain information on the 'hard to measure' indicators: "As a team implementing something a bit different like streaming, you would want to actually have a questionnaire that people fill out pre and post that could look at some of those team aspects that we talked about earlier" (I-104). The need for staff satisfaction surveys was also identified by others: "We do patient satisfaction surveys. I think we need to be doing staff satisfaction" (I-103).

The second area of interest to participants relating to data collection was concerned with why access to data was important, as captured in the following statements:

> If you are implementing something new it's important and really useful to have data frequently but that's because it is a process in evolution and you're making changes over time; without ongoing data it's really difficult to tell whether your changes have met your goal (I-104).

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[5] Pseudonym to protect identity

> I feel there is a lot of data from other studies and centers, but it would be most helpful to have more data from within our own sites. You may present national trends or data from multiple sites, but people tend to think they are special and don't fit the norm. Data from your own site is powerful (CL-101).

The third area of interest emerging from the data pertinent to data collection related to frequency of data collection. This aspect of the data collection dimension overlapped with 'timing' in theme two (creating a climate of focus and flexibility in planning). Several views are relevant to both themes:

> You collect data once you have done pre-and post data collection, ideally I think you do it again in a year and again in two years and then depending on whether there was slippage or not that I might stop there (I-104).

> The schedule must include evaluation and education at three, six, nine and twelve-months then depending on whether meeting/exceeding standards, less frequent audits thereafter. Eventually just do random audits for maintenance (I-105).

> Once you have established your process and it has become part of your culture then what you need is enforcement and enforcement can be considerably less frequent (I-103).

However, using recent experience of implementing a sepsis protocol in the ED, one participant gave an example of how a clinical condition may guide frequency of data collection:

> So a project like this, I think the disease is relatively rare and you need enough patients to make it significant so, a few data points doesn't help you so maybe you need a year of data because sepsis can be seasonal and so there's no point in comparing summer sepsis and winter sepsis. It also depends on the disease that you are monitoring like sepsis or fractured hip, so the frequency of accessing data is really dependent on disease (I-102).

The next dimension categorized under theme four was *results and feedback*. Key stakeholders were identified as primary recipients of results and feedback. The importance of communicating to executive and middle management was described by a participant: "They need the numbers because they are not on the frontline all the time so that is how they know, their indicators" (I-101). The most frequently referenced recipient of results was staff impacted by the new initiative. Receiving results was described as motivational for frontline staff: "At least one audit to show benefit or lack there of has been very useful and a huge motivator" (CL-105). Furthermore: "I think people for the most part, like to see those numbers because it gives them/validates what they are doing" (I-101). One participant commented on a success relating to the patient streaming QI initiative: "… like we had a 40% reduction in door to physician time. This was very powerful for staff and helps people to change and cope with change" (I-105).

The effect on motivating staff with data was made apparent in an interview:

> They're great because you can hang them on the wall and say, look what we did, or look we need to work on this, guys…come on, these are our patients. Those things are great in terms of motivation (I-104).

Results were also described as coming from sources over and above clinical audits: "Feedback comes from co-workers and patients… We have thank you cards on the same board as our bar graphs "(I-101). However, data indicated that messaging of results must be considered carefully:

> It's important but it needs to be put in context. The only problem I have with posting numbers, if we are doing badly…. there is a bit of defensiveness and they ask what were the circumstances on that day, and workload issues. Numbers do speak to people but they can raise some backs too (I-101).

In addition to having a motivational influence on staff, data revealed that results were used to ensure implementation fidelity (I-104) and build a business case for more resources: "More management of sepsis has been one of many issues leading to 24-hour Respiratory Therapist coverage at our hospital" (CL-104).

The final dimension in theme four was *post-implementation review*. Although only briefly acknowledged in this study, one participant eloquently described the value of doing a post-implementation review:

> One of the good things we did after south island was the post implementation review. So to help us to identify what we did well and what did we need to improve on for the next time and from different people's perspectives/different players' perspectives… It's very important. Sometimes I think in any major project, that piece gets forgotten (I-103).

Theme 5: Intervening to Enhance Effective Implementation

Data reported in the final theme - *intervening to enhance effective implementation* - captured participants' views of the implementation audit checklist and provided information that addressed the third research question: What is the influence of an implementation audit checklist on healthcare providers who have responsibility for the design, planning and implementation of new QI initiatives in the ED? Data were coded four primary dimensions including: (a) context; (b) application; (c) usership; and, (d) design. A further six secondary and two tertiary dimensions (familiarity and raising awareness) were also identified as presented in Figure 7.

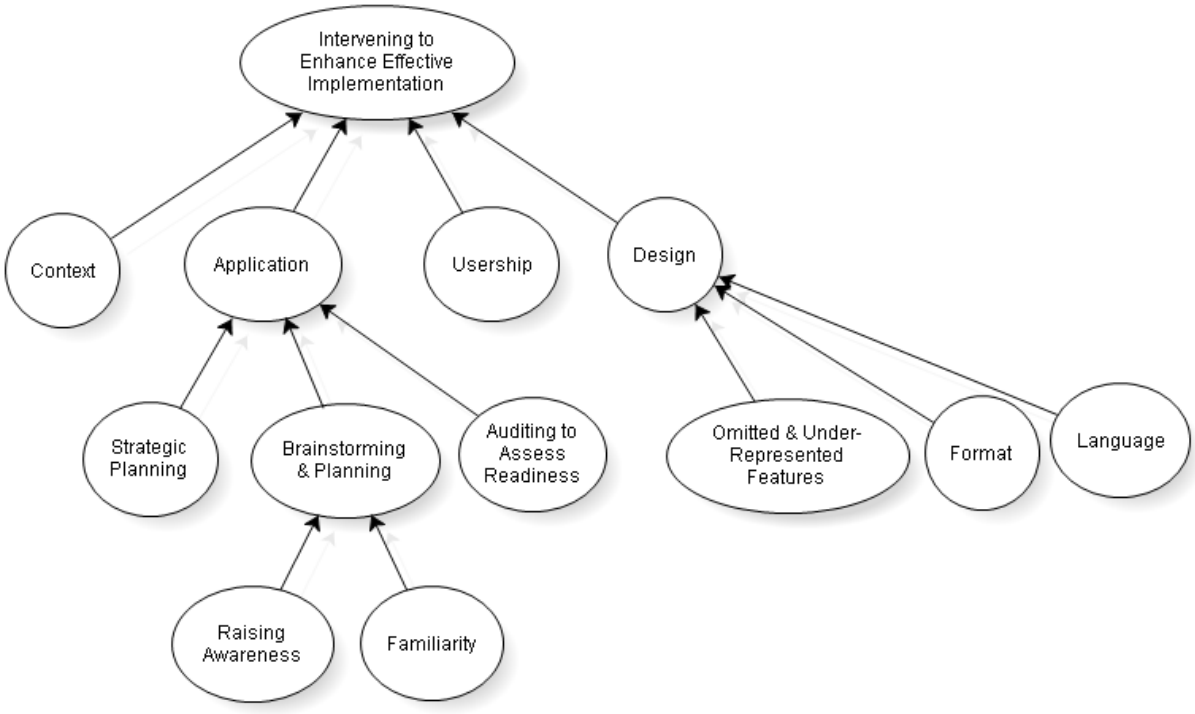

Figure 7. NVIVO model of theme 5: Intervening to enhance effective implementation

Research data coded under *context* referred to the environment in which use of the implementation audit checklist was perceived as appropriate. Data provided information to answer the second research question: How do the evidence-based factors derived from the OCM framework, and

listed in the implementation audit checklist, fit within the context of the ED setting. Participants were in agreement that the checklist factors were highly relevant to the ED as captured in the following interview statements: "We have been through some pretty major improvement initiatives recently, one which was after I completed this checklist. All the things on the checklist, they were relevant to streaming as well" (I-105); and, "It actually fit in quite nicely with our QA initiatives for example – the ideas on the checklist would have been useful. I can see that it would definitely guide us on how to make something stick in the department" (I-102). These statements were supported by the value ratings of each factor statement. The perceived value of each statement is summarized in Table 8.

Table 8

Summary of Checklist Statements Rated Critical by at least 4 out of 6 Participants

Checklist Question	Implementation Statement	Frequency Count of 'Critical' Rating	Frequency Count of 'Helpful' Rating	Frequency Count of 'Not Helpful' Rating	Alignment with Primary Dimension
Theme 1: Creating a Climate of Implementation Feasibility					
4c	Leaders have time and resources to support the Initiative.	5	1	0	Resources
6a	Leaders have committed money to support both Implementation and problem solving and/or there is external funding available to support.	5	1	0	Resources
5c	Middle management has time and resources to support the initiative.	4	2	0	Capacity & Resources
Theme 2: Creating a Climate of Focus & Flexibility in Planning					
3b	Issue has been clearly defined and				

Checklist Question	Implementation Statement	Frequency Count of 'Critical' Rating	Frequency Count of 'Helpful' Rating	Frequency Count of 'Not Helpful' Rating	Alignment with Primary Dimension
	needs/tasks identified.	6	0	0	Complexity
13	Proposed sepsis initiative can (without hurting effectiveness) be easily modified to make it more appropriate for your ED setting.	6	0	0	Adaptability
1a	If key ideas came from outside your organization, they have been tailored to meet your organization's needs.	5	1	0	Adaptability
14a	Implementation plan is simple and staff understands it.	5	1	0	Complexity
14c	Small tests of change or a pilot test(s) are used.	4	2	0	Testability
Theme 3: Creating a Culture of Inclusiveness through Partnerships					
8a	Clinical champion(s) is committed to making the sepsis initiative a success.	5	1	0	Engaging Staff
5a	Middle management is regularly involved and/or informed.	4	2	0	Engaging Management
8c	Clinical champion(s) respects values of staff.	4	2	0	Engaging Staff
9b	Staff leaders have been involved and believe that steps have been taken to meet most staff needs.	4	2	0	Engaging Staff
15b	Staff have needed skills to implement sepsis protocol.	4	2	0	Education

Checklist Question	Implementation Statement	Frequency Count of 'Critical' Rating	Frequency Count of 'Helpful' Rating	Frequency Count of 'Not Helpful' Rating	Alignment with Primary Dimension
9a	Healthcare provider(s) involved with the sepsis initiative know(s) staff needs and have taken steps to meet most staff needs.	4	2	0	Education
Theme 4: Creating a Climate that Mandates Evaluation					
16b	Performance data relating to new initiative is collected.	6	0	0	Data Collection
11c	Data is available on severity of sepsis problems/needs.	5	1	0	Current State Analysis
16a	A specific method exists to get honest staff and/or patient feedback, which is then, used to improvement the sepsis initiative.	4	2	0	Results & Feedback

In addition to factors perceived to be relevant in the ED, data revealed that factor relevancy extended beyond the ED setting as captured in the following participant's remark: "I think it's generic enough to be useful in many contexts. For example, clinical champion: If you took clinical out of there and just had champion, this could be used in any industry" (I-101). Similarly, participants noted that: "I think it can be used in multiple places. It goes beyond the boundaries of the emergency department" (I-103) and, "It's also every program that has to deal with this stuff, not just the emergency department" (I-106).

Data coded under the second dimension, *application*, was categorized into four secondary dimensions: (1) *factors influencing decision to use checklist;* (2) *strategic planning;* (3) *brainstorming and planning;* and, (4) *auditing to assess readiness*. Data indicated that the checklist could be applied to

various types of QI initiatives, such as implementation of clinical protocols and patient streaming (I-105). However, the size of QI initiative was noted to influence the decision to use the checklist as noted by one participant:

> Well, it would depend on the size of the project for sure. Or change that you want to implement. A small project like a glucometer – we have one person in the department responsible for bringing the staff up to speed. But as soon as the project becomes bigger and involves process issues, then the checklist would be used there (I-101).

There was widespread consensus among participants on the implementation audit checklist's application in the ED setting. Participants agreed that the checklist could be used during a variety of stages in the implementation process. The first included the use of the checklist as a tool to assist the decision-making process relating to which initiatives to take on. This data had a strong interface with results categorized under theme one relating to capacity and resources. As described in interview data: "We could use the factors listed in the checklist to help us triage which initiatives we take on" (I-102) and "Before embarking on any QI initiative a template or checklist type of process like this to better rationalize the appropriate deployment of resources" (I-106). Similarly, the following statement provided further support for the potential triage properties afforded by the checklist:

> A lot of the checklist is based on what might be needed in order to move things forward. And I think that depending on the resources that you have available you might abandon a plan that requires support of a level that you don't have (I-103).

When discussing the use of the checklist, participants indicated some value in its capacity for brainstorming and planning, the third secondary dimension coded under application. As one participant remarked, it could be used in getting started, depending on experience of the implementer:

> I think I would do it as early as I could in the planning stage because really at that stage, that's when you can still incorporate any ideas that you might consider just beyond your own experience so if your own experience is limited and you don't have a firm idea of where you want to go with it, that can really be crystallized with the checklist (I-104).

The concept of the checklist being used as a prompt was also acknowledged by several participants, as noted in the following statements: "I think that when we all look at a change initiative, we have a vision of where we want to go and a checklist makes sure you are not missing some key pieces" (I-103), and, "If you know that you don't have it, then it gives you a chance of finding out whether you can work without it or if you have to have it in place before moving forward" (I-102). Data indicated that the checklist raised awareness of some features that would not normally have been considered as important to effective implementation: "It was quite a learning experience for me to use the checklist. And there were some things that I had never thought of before…Leadership set high performance expectations – that was something that completely out of my realm of thinking" (I-101). For some participants, information included in the checklist was already familiar: "I guess I did know about most things but there were a few things were brought to the forefront" (I-105). Similarly, data gathered in an interview suggested that: "Some of this stuff is intuitive but not all of it. As a resource it would be good but a lot is intuitive" (I-102).

The final secondary dimension coded under application was *auditing to assess readiness*. There was consensus on the usefulness of the checklist as an intervention tool to determine whether the QI initiative was sufficiently planned to move forward onto the next stage. The following statements capture the essence of the data relating to this dimension: "To me it makes sense that you would want to come back and assess to see if you have all the factors in place" (I-101) and, "Repeat the checklist as an audit before roll-out to make sure everything is in order before implementation" (I-104).

The third primary dimension coded under theme five was *usership* and was defined as 'individuals using the implementation audit checklist'. Data indicated that the checklist was appropriate for use through multiple levels of the healthcare system as well as by multiple disciplines as described in the following statements:

> I think across the board, literally. I don't think it would go to all frontline staff but if a frontline staff member was going to be taking on a project, I think this checklist would be useful to them as a framework. Most definitely interdisciplinary and different levels within healthcare too (I-101).

> I think perceptions on the importance of the factors would be similar no matter what level you are in the organization – frontline leadership, middle, senior or executive. All levels of the organization should use the checklist or at least everyone except the bedside practitioners. The senior levels need to know what is important for successful implementation (I-105).

> I would say that less than half of the leadership even get this, depending on at what level of leadership you are at. I wouldn't expect anyone much lower than program medical director to understand stuff like this. Site chiefs and managers, I'm thinking probably not. Although the very senior leaders would only need to know about the content of the checklist as opposed to using the checklist I think (I-106).

The final dimension categorized under theme five was *design* and related to data coded under three tertiary dimensions including: (1) omitted or under-represented features of the checklist; (2) format; and, (3) language. A key feature that was perceived as under represented was communication and data suggested that it be brought into its own statement (I-103). A second oversight in checklist content pertained to timing. In addition to data coded in theme four identifying the importance of timing as a factor integral to evaluation, data reported in theme two also supported the importance of articulating timing in the checklist with respects to planning and testing.

Finally, participants provided brief comments on format and language which provided suggestions for improving the checklist. Comments are summarized in Table 9.

Table 9

Participants' Comments Relating to Format and Checklist Language

Secondary Dimension	Description	Source
Format	"I think it's important to keep the factors and ratings. I also think it's important that we have the yes/no and the importance."	I-101
	"I think a one-pager would be useful though – this was long…make the comments column into an action plan."	I-102
	"Delete the 'Not Important column' and add an 'Important' column. I think the critical and important columns would guide my decision as to whether I was going to go ahead with the initiative (that is, if I had any say on whether we go ahead or not)."	I-103
	"(1) Revise question relating to staff/patient understanding needs/problem and integrate with evidence based practice and external influence. One automatically leads to the other. (2) Look at clinical champion and integrate or revise with multidisciplinary improvement team or project team. (3) Instead of comments and explanation for rating, use this as the action plan/work plan."	I-105
Language	"I would identify the levels that you are referring to because I think each user that the term middle manager and upper manager would mean different things. "	I-104
	"Part of this is the language in the checklist so problems and needs… what does that mean.	I-106

Chapter Five: Discussion

This study has provided a rich insight into features of the implementation process pertinent to the ED as well as practicalities associated with an innovative implementation audit checklist to facilitate translation of implementation theory into operational and clinical practice. The ED in Western Canada is highly complex, decentralized and geographically diverse. Within this regionalized health service delivery model, leadership and management have a shared responsibility with multidisciplinary improvement teams to design, plan and implement QI initiatives to improve quality of emergency care. It is in this context that this study's two key findings are discussed. The first key finding was that there exists a series of dimensions perceived to influence the implementation of QI initiatives in the ED (research question one). Five themes emerged as dimensions that were intuitively similar were grouped together including: (1) creating a climate of implementation feasibility; (2) creating a climate of focus and flexibility in planning; (3) creating a culture of inclusiveness through partnerships; (4) creating a climate that mandates evaluation; and, (5) intervening to enhance effective implementation. These dimensions embraced data emerging from interviews and the implementation audit checklist which provided evidence of the fit between the theoretically derived factors listed in the audit checklist and the context of the ED (research question two).

The second key finding was that an implementation audit checklist was perceived as a useful intervention tool that translated the theoretical dimensions of innovation diffusion into a practical stepwise roadmap for implementation (research question three). Through using the checklist, steps were identified that often were unintentionally missed when implementing QI initiatives in the ED. Further discussion of these results addresses: (a) the series of implementation dimensions that were identified; and, (b) the use of the implementation audit checklist.

Section One – Dimensions Perceived to Influence QI Implementation

Results from this study align closely with previous research on independent contextual factors (Weiner et al., 2008; George, Durbin, Koegel, 2008; Ganon, Duplantie, Fortin, & Landry, 2006), implementation models (Greenhalgh et al., 2004; Rycroft-Malone et al., 2004; Rycroft-Malone et al., 2002; Klein et al., 2001; Grol and Jones, 2000, Rubenstein et al., 2000; Kotter, 1996; Rogers, 1995) and critical success factors (Molfenter et al., 2005; Gustafson et al., 2003). However, Rogers (2003) diffusion of innovation model appears to be a best fit for this study's data, with some modification based on the two key findings.

Rogers' classical diffusion of innovation theory is described as a naturalistic process of change or diffusion of innovation (Graham & Logan, 2004) and includes a series of choices and actions that an individual, decision-making unit or organization makes over time, during which a process is evaluated, tried and adopted for spread or discontinued. Potential adopters pass through five stages when deciding to adopt an innovation (Rogers, 1995): knowledge (becoming aware of the innovation's existence, and obtaining understanding on why, how and when the innovation works; persuasion (developing positive attitudes toward the innovation); decision (making a cognitive decision to adopt the innovation, or developing the intent to adopt); implementation (using the innovation) and confirmation (continuing to use, adapt or discontinue use of innovation). Furthermore, Rogers (2003) described variables that influenced the rate of individuals' and organizations' adoption of innovations. Innovations were reported to be more quickly adopted if they were: (a) seen as more advantageous than current practice; (b) fit with existing values and beliefs; (c) easy to use; (d) observed by others to be in use; and, (d) easily tested prior to its formal adoption as future practice (Graham & Logan, 2004). Another contribution of Rogers' seminal work on diffusion theory was his observation that potential adopters reported characteristics that influenced how quickly they would adopt the innovation. Categories included innovator, early adopter, early majority, late majority and laggard (Rogers, 2003).

Research into effectiveness is a valuable resource for healthcare and with it has come an increasing interest on how to diffuse innovations into complex organizations. This was realized by Rogers who advanced his theory of diffusion to encompass the social network systems found in organizational diffusion (Rogers, 2003). His innovation process for organizations built on the aggregate behaviour of an individual's innovation behaviour and consisted five stages including: (a) agenda setting; (b) matching; (c) redefining/restructuring; (d) clarifying; and, (e) routinizing. Similarly to variables affecting the innovation-decision process for individuals, Rogers identified a set of variables influencing rate of adoption in organizations. These included: (a) innovativeness of the organization (centralization, complexity, formalization, interconnectedness, organizational slack, size, system openness); (b) types of decision-making (optional, collective or authority-driven); and, (c) communication channels within the social system (Rogers, 2003; Dearing, 2008). Variables reported to be common to both individual and organizational processes included: (a) change agents; (b) opinion leaders; (c) diffusion networks; (d) earliness of knowing about the innovation; and, (e) consequences of diffusion (Rogers, 2003).

The portrayal of diffusion stages and influential variables identified by Rogers (1995, 2003) provides a means of simplifying the complex healthcare setting identified in this study while simultaneously illuminating healthcare providers' behaviour and how they respond to change. However, the three key findings from this study provide rationale for proposing a modified version of Rogers' models that: (a) combines stages and the influence of variables, identified in Rogers' individual and organization models, while capturing the complex implementation environment in which Western Canada healthcare providers now provide emergency care; and, (b) provides a stepwise protocol for the diffusion of a new innovation in the ED. Thus, rather than being limited to the individual adopter characteristics and steps that individuals progress through en route to implementing a QI initiative, the modified model will bring to the forefront the system level change that Rogers brings to this area of enquiry in his organizational model while understanding individuals and smaller decision-making groups within the

system. This is more reflective of the healthcare setting experienced by participants in this study. The proposed model, *modified diffusion of innovation model for a complex healthcare environment*, is presented in Figure 8 and provides the platform for the discussion of this study's results.

A number of assumptions are implicit in the proposed modified *diffusion of innovation model for a complex healthcare environment*. First, innovation diffusion occurs over time and it progresses through stages. The stages may or may not occur sequentially as progress is dependent on the dynamic context of the healthcare setting as well as adopter characteristics. Individuals do not move en masse through the stages as they progress through the cycle at a rate determined by their adopter characteristics. Second, although presented as a linear diagram, the innovation-decision process is not uni-directional. Individuals (and decision making units) may move back and forth between stages depending on adopter characteristics. Stages may also be omitted or repeated. The lack of uni-directionality simply reflects the complexity of innovation diffusion in the Western Canada ED setting. The final assumption is that there is optimal staff and management engagement, as well as persistent and continuous communication throughout the entire diffusion process. The model will now be discussed in the context of results from this study. Each model stage will be discussed in relation to the seminal work of Rogers' diffusion of innovation theory (Rogers 1995, 2003) which will create a reflective platform from which the study's results will be discussed.

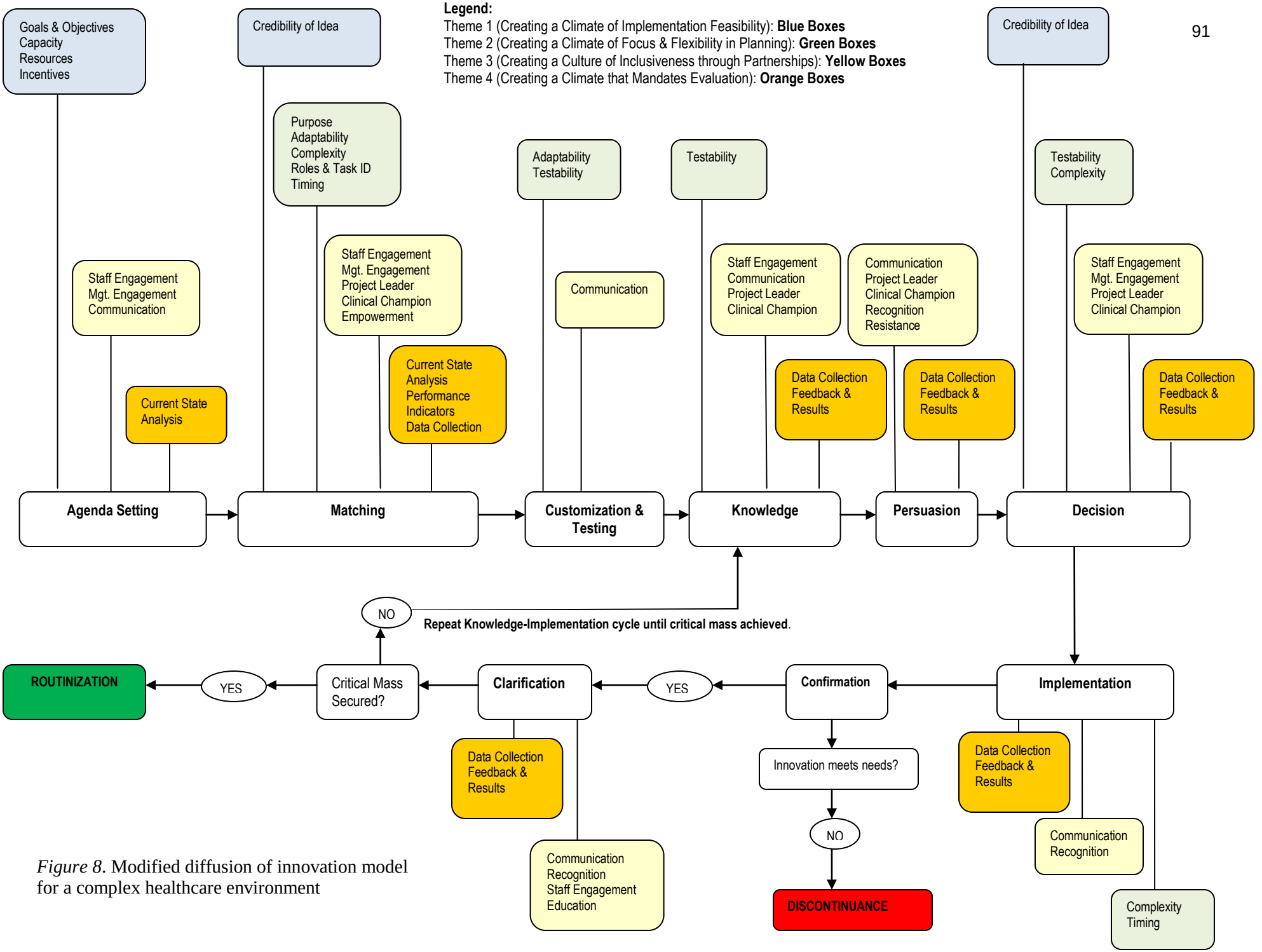

Figure 8. Modified diffusion of innovation model for a complex healthcare environment

Agenda Setting

According to Dearing and Rogers (1996, cite Rogers, 2003, p. 422) *agenda setting* is the mechanism by which "needs, problems and issues bubble up through a system and are prioritized for attention". Performance gaps that highlight the discrepancy between an organization's expectations and its actual performance are used to create some pressure on decision-makers so they agree to make the 'need or problem' a priority for action. Solutions to the needs and problems are also reported as being discussed during agenda setting. Data, coded under theme one (creating a climate of implementation feasibility) which identified organizational-level activities required to 'give the QI initiative legs', intuitively aligned with Rogers' agenda setting. These appeared to be the hard wire elements considered by participants as important when determining implementation feasibility.

The concept of prioritization aligns with this study's dimension of goals and objectives. Results suggested that if a QI initiative was not aligned with organizational goals, then it was a lower priority and thus would be less likely to receive sufficient resources such as funding, staffing, equipment and information systems and technology support as well as leadership support. However, the likelihood of alignment of frontline clinicians' with leadership goals was reported as being problematic as clinicians were generally focussed more on the immediate needs of the patient i.e., administering antibiotics on time in accordance with national standards rather than the strategic direction of the organization. Although both leadership and clinicians reported to be working ultimately towards the organization's vision and philosophy to provide to patients the best care possible, there was some difficulty in demonstrating that clinical QI initiatives such as the sepsis protocol were fully aligned with leadership goals and objectives.

This lack of consensus over goals has been experienced in the United Kingdom with respect to the implementation of community care policy (Trnobranski, 1995). Trnobranski concluded that consensus over goal-making decisions was critical to effective implementation and that involvement of staff in this decision-making process was an important factor. This in turn, was reported to reduce resistance and

facilitate effective innovation diffusion. Lack of consensus over goals may be an artefact of the decentralization experienced in the health region's health system in which smaller decision-making units such as individual EDs are now empowered to establish their own unique QI agenda. Although the benefits of a decentralized system are well documented (Orlandi, 1986), the existence of multiple agenda setting processes through various levels of the system could result in a lack of strategic direction with multiple initiatives competing for resources and leadership attention. The lack of consensus over goals may also negatively influence the availability of incentives which could be used to encourage individuals and EDs to buy into the innovation. Incentives have been reported elsewhere in the literature as being useful in innovation adoption (Kotwal, 2005) and "may be direct or indirect… to an individual or a system in order to encourage behavioural change" (Rogers, 2003, p. 236).

There was little evidence from this study's data to suggest that the system in which participants worked had an effective agenda setting stage as a platform for collective decision-making in which multiple levels of the organization participated to determine goals and strategic direction. This in turn would provide a mechanism for prioritization, a mechanism that could triage needs and problems identified by individuals at all levels of the organization. Collective decision making was reported by Rogers (2003) as one of three types of decision-making that influenced the rate of innovation diffusion. Optional and authority-driven are the other two ways in which decision-making may occur (Rogers, 2003). However, as reported by Klein and Knight (2005), authority-driven decisions are seen as a stumbling block to effective implementation. Ideally, collective decision-making would assist clinicians and leadership in determining which QI initiatives would be adequately resourced so that successful implementation could be achieved. In effect this would also address the capacity issues described in this study that resulted from multiple competing demands from key stakeholders of the ED. The data clearly indicated that a consequence of concurrent multiple implementation efforts was the lack of resources to support the implementation process, resulting in a negative impact on both patient and staff outcomes.

The critical need to adequately resource QI initiative implementation is widely cited in the literature. Lipshutz and colleagues identified that having human and financial resources to conduct work-flow analysis and data collection was key to successful implementation of three QI initiatives in critical care (Lipshutz et al., 2008). Similarly, adequate resourcing was perceived as a critical component of organizational change management (Gustafson et al., 2003; Olsson et al., 2003; Sterling, 2003). Elliot et al. (2003) lent support to this perspective reporting that implementation was positively related to capacity as a pre-requisite for implementation of a community based heart health promotion innovation. While data identified the important role of current state analysis in helping engage staff and physicians and get buy-in for the new innovation later in the diffusion process, it may be of value to use it at the outset as a decision-tool in assisting QI initiative prioritization. As a need or problem is presented during agenda setting, an evaluation of its severity may assist in prioritizing the selection and implementation order of QI initiatives, thus creating some tension for change.

Matching

Matching is the second stage in the proposed modified model and is defined by Rogers (2003, p.423) in his organizational model as "the stage in the innovation process at which a problem from the organization's agenda is fit with an innovation and then the match is planned and designed." 'Fit' is described as the process of meeting the organization's or other decision-making unit's needs with respect to providing a solution to the problem or issue. The compatibility of the innovation was described by Rogers as one of the variables influencing rate of innovation adoption. Results from this study suggest that there are three ways that, ideally, an innovation should fit. The first is clinical fit. This study indicated that credibility of initiative played a substantive role is determining whether healthcare providers and/or the organization would entertain the innovation as a possible solution of the identified need. This finding mirrors that reported by Shojania and Grimshaw (2005) who reported that not only must clinical interventions be robustly supported by scientific evidence, so too should system interventions designed to improve quality care. There appeared to be differing perspectives in this study, on whether ideas

originating within or externally to the organization held more credibility. Data indicated that, although it did not really matter whether the idea originated from, there was a sense that when ideas originated externally they were deemed to be more credible.

A more prolific factor in determining credibility however, was the research and evidence-based knowledge supporting the QI initiative. This observation was made in this study when participants reported the importance of knowing the sepsis protocol was based on national and international clinical standards of care. Results inferred that the greater the credibility of the innovation[6], the more likely it was to be adopted by healthcare providers in routine emergency practice. This inference is supported in the literature where it has been reported that credibility was strongly linked to the rate of spread of an innovation and was reported to account for between 49% and 87% of the variance in the rate of spread (Rogers, 1995). From a clinical perspective, there is no doubt that initiative credibility is a critical process in determining 'clinical fit' i.e., matching it appropriately to the disease or clinical condition. However, the credibility of an innovation is necessary but not sufficient for individuals and organizations to decide to adopt an innovation (Panzano et al., 2006).

Results suggested that the second way to determine the fit of the innovation was to match the innovation with the values of the clinicians. This finding was also widely supported in the literature (Holohan et al., 2004; Klein et al., 2001). Fit at the individual's level was described as "the extent to which targeted users perceive that use of the innovation will foster (or inhibit) the fulfillment of their values," (Helfrich et al., 2007, p. 283). Values in this context were described as generalized and enduring beliefs about an innovation. The degree to which the innovation matched with the need or problem was identified as being critical to the sustainability of the innovation (Goodman & Steckler, 1989) as well as influencing the rate of innovation adoption (Berwick, 2003; Rogers, 1995).

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[6] QI initiative and innovation are used interchangeably in the discussion section of this study

The third and final mechanism in determining 'fit' identified in this study was the need for the innovation to fit within the organizational structure. This mechanism identified in this study was reported as being particularly relevant for large, organization-wide innovations such as e-health technology implementation. Sterling (2003) supported this finding when he acknowledged that innovation must fit conceptually, philosophically and logistically in order to be readily adopted in the organization. Fit of the innovation is inherently associated with its adaptability to suit the clinical setting as well as individual and organizational values and was identified in this study as a dimension in theme two (creating a climate of focus and flexibility in planning). This is very similar to Rogers (2003) compatibility variable in the organizational diffusion of innovation model.

The remaining two elements of matching described by Rogers related to innovation design and planning. Described by participants in this study as the preparatory stage, it was noted as being "way longer than implementation and way harder" (I-103). It is here that results from this study highlighted a weakness of Rogers' (1995, 2003) models in that they did not sufficiently stress the depth and breadth of detail required in the design and planning process. Results from this study suggested that there were three key elements relating to design and planning. The first element related to the complexity of the innovation.

Rogers identified complexity as a variable influencing the rate of innovation adoption and defined it as "the degree to which an innovation is perceived as relatively difficult to understand and use" (Rogers, 2003, p. 256). This study highlighted that innovation scope was included with complexity. Even nominally single focus interventions, for example the ED sepsis protocol, included multiple components that crossed disciplines, program boundaries, and geographic locations and therefore were regarded as having a high degree of complexity. Complexity is an important element to consider as it has been associated with the rate of adoption. In a qualitative study of the implementation of an empowerment-education intervention for diabetes patients, Adolfsson and colleagues reported that clinicians struggled with role changes required by the intervention even though they (the clinicians) perceived the intervention

to be beneficial (Adolfsson, Smide, Gregeby, Fernstrom, & Wikblad, 2004). This was similar to findings highlighted in this study where data indicated a work-flow redesign initiative in the department that reduced waiting time for patients to see an emergency physician was perceived to be highly complex due to a number of components, one of which was staff changes. Complexity is also reported to be negatively related to user satisfaction and the speed required to achieve competency with the innovation (Aiman-Smith, & Green, 2002).

The second key element and most crucial to the dynamics of planning was the involvement of appropriate staff and management to take the innovation forward from the design stage through to implementation. Study data highlighted the critical importance of engaging staff and management from the outset of the idea and continuing this throughout the remainder of the diffusion process. Although a subtle characteristic of the first stage (agenda setting) when one or more individuals become engaged at the outset of the innovation because of the need or problem in the first place, engagement of staff and management is also accentuated in the second stage. Results indicated that there should be individuals representing the diversity of occupations, specialities, rank as well as geographic location appropriate to the innovation being planned. In addition to expertise, findings also suggested the need for clarity around roles and tasks. Of particular note were the discussions relating to the selection of a clinical champion(s) and a project leader depending on the complexity of the innovation.

For innovations that were relatively simple and limited to innovation impact within a single department, data suggested that one individual such as a clinical champion would be sufficient in leading and implementing the change. Rogers defined a champion as "a charismatic individual who throws his or her weight behind an innovation, thus overcoming indifference or resistance that the new idea may provoke in an organization" (Rogers, 2003, p.141). However, for innovations that crossed boundaries of care and speciality, involvement in the planning stage was more inclusive and involved a project leader. Rogers (2003) defined a project leader in terms of a change agent and qualified them as being experts of the innovation to be diffused. The responsibilities of the project leader identified in this study were

similar to those of the change agent identified by Rogers (p. 369). These included: (a) creating an awareness of the need to change through presenting results of the current state analysis; (b) developing relationships which were perceived by staff as credible, competent and trustworthy; (c) identifying staff and patient needs associated with the innovation; (d) identifying opinion leaders and encouraging their participation in developing open communication channels; and, (e) continuing with diffusing the innovation until stabilization is achieved. Findings from this study reported the project leader needs to work with a team of individuals who represented clinical specialities impacted by the innovation, individuals with expertise in statistics, quality assurance/ improvement techniques, information technology/information management, communication and leadership skills as well as the clinical champion(s). Data identified that such a group of individuals should be members of the improvement team or working group and that involvement would ebb and flow depending on the stage of innovation diffusion.

Using Rogers (2003) terminology, the improvement team may be described as a small *decision-making unit*. Participants in this study described this decision-making unit as sharing responsibility to move forward the QI initiative. Strategies for empowering this group of individuals were also identified in this study during planning. Collectively, this group of individuals had decision-making authority within the organization, leadership skills, credibility with their peers and expertise relevant to the QI initiative. Kotter referred to improvement teams as *guiding coalitions* (Kotter, 1996, p. 57) and described team selection as an imperative step because these individuals will guide the change management project. Kotter identified characteristics for the team members including: (a) well-defined skill set including having relevant knowledge about the healthcare setting and ongoing changes within it; (b) ability to establish credibility with peers; (c) development of relevant knowledge regarding the inner workings of the department, division or group; (d) formal authority; and, (e) leadership skills. There is a plethora of literature relating to efficacy of teamwork in healthcare. However, the concept of improvement teams appears to be under-researched.

The third and final key element in planning is the development of an implementation plan. This study identified six relevant dimensions: (1) purpose; (2) identification of roles and tasks; (3) current state analysis; (4) performance indicators; (5) data collection; and, (6) timing. While purpose, identification of roles and tasks and scheduling appeared as obvious elements of the implementation plan and have been cited in the literature (Abed et al., 2000), the critical role that current state analysis, data collection and feedback and results played during the diffusion process was identified suggesting that diligent planning was required to ensure that this occurred. This finding was complimentary to Rogers (1995) who suggested that data collection and evaluation should be considered during the course of diffusing the innovation, rather than gathering evaluation data at the end. Sterling (2003) added to this, remarking that ongoing data collection helped keep implementation on track and enabled adjustments to be made that overcame challenges and barriers.

Customizing & Testing

The third stage in the proposed modified model of diffusion of innovations for the complex healthcare environment is two inter-related steps – *customization* of the innovation and *testing* prior to wide-spread diffusion. This additional stage was created in response to the findings from this study that articulated the criticality of meeting local needs and the importance of having a trial period during which the innovation could be tested and slowly diffused into the ED setting. These two inter-related stages were reported to provide opportunity for individuals on the improvement team as well as 'keen staff' to identify problematic aspects of the innovation and steps to be taken to ameliorate these before the innovation was implemented more widely.

Customization refers to a critical analysis of an innovation to determine whether all elements of the innovation are suitable and/or applicable to the local problem or issue (Rogers, 2003). In this study, this process was illuminated by participants when they discussed customizing a national, evidence-based sepsis protocol. Participants explained that they customized the sepsis protocol for several reasons. First,

the antibiotics listed on the national protocol did not match the health region's antibiogram. As explained by one participant: "You must be able to adapt the national evidence-based information to meet local clinical needs" (I-105). Second, the visual format of the protocol was not familiar to the organization which already had a standardized clinical standard format. Data from the study's checklist comments put this issue into context: "There are many ways to adjust the approach and the tools to make them more applicable for your site (format of the screening tool, how to deliver messages, etc.,)" (CL-101). Third, some aspects of the protocol would need to be optional depending on the geographical location (e.g., urban vs. rural emergency departments) and availability of resources and expertise within different EDs.

Customization is not without its critics however and raises the issue of fidelity. Adherents of innovation fidelity argue that deviating from the original innovation reduced the likelihood of the innovation effectiveness (Dearing, 2008). This argument was supported in the education field where innovation supervision of implementation fidelity resulted in high quality program delivery (Hansen, Graham, Wolkenstein, & Rohrbach, 1991). However, at the other end of the continuum are researchers who reported that in order for innovations to work in organizations, the innovation must be adapted locally (Berwick, 2003). The debate over re-invention and fidelity is a valid one and deserves attention in the clinical setting where both viewpoints should be considered. In the case of diffusion of the sepsis protocol reported in this study, data indicated that it was critical for content and formatting changes be made to meet local needs. However, the protocol's core elements such as triage identification, timeliness of bolus fluid, and other critical elements remained unchanged in accordance with national clinical standards. The visual appearance of the protocol was also modified to fit the standardized format specific to the health region. Customization of a national standard-based cardiac protocol was also reported in this study, with similar formatting refinements made to enhance familiarity for users.

Inherent to the customization process is the opportunity to test the innovation, either in its original or modified state. Although Rogers recognized *trialability* as a variable that influenced rate of diffusion, extensive literature support the findings from this study and indicated that it warranted increased visibility

in the modified diffusion model. The Institute of Healthcare Improvement (IHI, 2008) identified seven reasons for testing change including: (1) To increase the belief that the change will result in improvement; (2) To decide which of several proposed changes will lead to the desired improvement; (3) To evaluate how much improvement can be expected from the change; (4) To decide whether the proposed change will work in the actual environment of interest; (5) To decide which combinations of changes will have the desired effects on the important measures of quality; (6) To evaluate costs, social impact and side effects from a proposed change; and, (7) To minimize resistance upon implementation.

Small tests of change, referred to as the *plan, do, study, act* (PDSA) cycle in this study, were seen as critical to test, adapt and re-define QI initiatives as they were introduced into the emergency department. The PDSA cycle clearly defines a four-step process to guide the testing process (Nelson, Batalden, & Godfrey, 2007) which is then repeated as the innovation is evaluated and diffused throughout the target audience. In a study on medication reconciliation, Varkey and colleagues used the PDSA process in which their innovation underwent several cycles of customizing and testing before the final version was successfully adopted and spread to become routine clinic practice (Varkey, Cunningham, & Bisping, 2007).

The positive outcomes of customizing and testing innovations in the clinical setting are reported widely in the literature. Johnson and Raterink (2007) used the four-step cycle to plan the successful implementation of a clinic redesign for diabetic patients. The cycle was also the process of choice to assist with implementation of ventilator acquired pneumonia bundles and a sepsis protocol (Lipshutz et al., 2008). Lipshutz and colleagues reported on the importance of being able to make adjustments to clinical protocols during a phased implementation into the critical care setting. Use of PDSA cycles has also been reported favourably when implementing system level interventions to enhance patient care (Berwick, 2003). Positive findings on testing extend beyond healthcare into the education setting where the trialability of an integrated health education curriculum was studied. The flexible approach afforded by

the PDSA process was reported to enhance the roll out of a school education program because it allowed principals to commence implementation with a small number of teachers (Wiecha et al., 2004).

Since its adoption by the Institute of Healthcare Improvement, the exponential use of the PDSA process in healthcare has been associated with noteworthy successes in QI implementation, some of which were noted previously. Participants in this study were enthusiastic and supported the critical value of the PDSA cycle, perhaps reflecting the international acceptance of the PDSA process in healthcare (IHI, 2008) Based on this, there appears to be sufficient evidence to support the reclassification of Rogers' (2003) 'trialability' from an influential variable to a clearly defined stage in the modified model of innovation diffusion in a complex healthcare environment. The PDSA cycle has not appeared in Rogers' (1995, 2003) diffusion of innovation work before, although it is inferred in the clarification stage of his organizational model.

Knowledge

The next stage presented in the modified model is *knowledge*. Knowledge occurs when an individual (or other decision-making unit) is exposed to an innovation's existence and gains an understanding of how it functions (Rogers, 2003). This is a logical step forward from the customizing and testing stage as knowledge of the innovation gradually increases exposure during the PDSA cycles. According to Rogers (2003) there are three types of knowledge that adopters require about an innovation: information on what the innovation is (awareness knowledge), how it works and why it works. Having sufficient knowledge prior to implementing an innovation has been associated with the eventual adoption or rejection of an innovation (Rogers, 2003). The importance of knowledge was identified in this study and was captured in the dimension – education - which was coded under theme three (creating a culture of inclusiveness through partnerships). Several strategies were proposed to enhance education including rounds, follow up chart reviews, clinical in-services, both formal and informal, and collaboratives.

The role of education in enhancing quality of care has been widely cited in the literature. In a systematic review of the barriers to optimal clinical practice, knowledge, awareness and skill/expertise have been researched the most frequently (Cochrane et al., 2007). In the extensive field of enquiry studying the influence of education on implementation of clinical guidelines, awareness knowledge was reported as the most frequently reported barrier to effective implementation (Cabana et al., 1999). Without the understanding of what and how the innovation improved quality of care, there was limited incentive to use it (Grimshaw et al., 2004). The role of education was also studied in the context of factors influencing routinization of clinical protocols. Zubrow and colleagues observed a downturn in sustained used of the protocol whenever the intervals between education updates exceeded two or three months (Zubrow et al., 2008).

Findings from this study suggested that knowledge should not just be restricted to the 'what, how and why' of the innovation. Rather, knowledge encompassed the information that put the innovation into context. Communicating the results of the current state analysis that portrayed the severity of the problem was reported to increase clinicians' desire for education, and rather than having to 'sell' education to colleagues, this study revealed that clinicians actively sought out information from clinical champions in the department. In a logical progression, in a complex healthcare environment, from the knowledge stage is the fifth stage in the proposed modified model of innovation diffusion where knowledge was identified as just one of the mechanisms used to persuade individuals to adopt the innovation.

Persuasion

Persuasion occurs when "an individual (or other decision-making unit) forms a favourable or unfavourable attitude toward the innovation" (Rogers, 2003, p. 174). As identified at the beginning of this discussion section, Rogers identified multiple variables that potentially influenced individuals' perceptions of an innovation. Findings from this study revealed that the dimensions aligned with the agenda setting and matching stages in the model were all major contributors to the process of persuading

clinicians to adopt the innovation. Data from this study were particularly striking in four of these dimensions: (a) resistance; (b) communication; (c) feedback and results; and, (d) recognition.

Resistance

Resistance was defined in this study as the degree of scepticism shown by staff toward the innovation. From the data it was found that no matter how much planning was done, most initiatives and changes were met with a degree of scepticism and it was the role of the clinical champions and project leader to work through the resistance that arose. One creative solution used by participants was to purposively recruit 'naysayers' during the early stages of innovation exposure i.e., during staff meetings when the innovation idea was brought forward to staff. Working carefully with and mentoring a naysayer at the outset of the project eventually resulted in the staff member becoming a strong opinion leader who managed to sway the undecided group to adopt the innovation. Rogers (2003) acknowledged the important role held by opinion leaders, defining them as "an individual who is able to influence other individuals' attitudes or overt behaviour informally in a desired way with relative frequency" (p. 27). An interesting finding from this study was the importance of understanding the reason behind the scepticism, best exemplified by a participant in this study when they said: "I think you have to look to see what the motivation is for somebody who is negative. Maybe they have never felt that their contributions have been recognized" (I-103).

Reasons for showing resistance was researched by Pickett (2008) who concluded that uncertainty around job security, lack of consultation with staff and perceived threat to established patterns of work all contributed to individuals' negative perception of innovation. An interesting finding from research in cancer care identified that if something was not perceived to be broken then the 'fix' was met with resistance (Abed et al., 2000). Other reasons for resistance were proposed by Offredy and Ahluwalia (2006) who reported that a fear of increased workload, the loss of independence of a professional group and insufficient communication were identified as significant barriers to implementation of a

Government-imposed improvement program in the primary healthcare setting. Similarly in this study, workload, capacity and lack of communication were perceived as reasons for resistance to QI initiatives in the ED.

Communication

Communication was the eleventh most frequently referenced dimension in this study (refer to Figure 2). It was also inherent in many of the other dimensions e.g., engagement, feedback and results, resistance, empowerment, education, current state analysis, clinical champion and project leader. The fact that participants afforded it its own dimension revealed that it was important to pay attention to formalizing communication rather than assuming it will happen. This was also supported in the feedback about the implementation audit checklist where participants identified the need for a checklist item dedicated to communication strategies. This finding is aligned with Rogers (2003) perspective on the value of diffusion networks and the importance of understanding the principles of communication between groups of individuals within social systems.

Rogers' (2003) perspective also aligned with results from this study that showed that project leaders are able to secure more positive results with staff that shared similar backgrounds. Rogers described this as homophilous and heterophilous communication i.e., the degree to which a pair of individuals who communicated were similar. Findings from this study identified that both physician and nursing champions were required to act as the 'go-to person' in the department. In light of Rogers' homophilic and heterophilic principles, physicians would be more likely to respond more positively to a physician champion, and similarly for nurses to a respond to a nurse champion. The other key channel of communication revealed in this study was the multidisciplinary improvement team. This team enabled heterophilic communication to occur. Described as a bridge between two sets of different individuals, heterophilous interpersonal networks connect different parts of a system and thus convey information on the innovation. In the healthcare setting this is important, as while there are few issues associated with

nurses talking to nurses, and doctors talking to doctors, there is a heightened need for the two groups to clearly and effectively communicate in order to deliver quality care. There could be also be the need for heterophilous communication further in the complex ED setting to include bridges between urban and rural communities and between specialities as well as between different levels of the organization.

Feedback & Results

The establishment of communication channels between key sets of individuals was identified in this study as the precursor to enabling feedback and dissemination of results to staff and other key stakeholders. Categorized under theme four (creating a climate that mandates evaluation), *feedback and results* was perceived as critical to the success of implementing the sepsis protocol and other QI initiatives. Indeed, findings from this study reported that ongoing performance data acted as an effective mechanism to get buy-in for the innovations as well as being a motivator for continuing its use. It is interesting that Rogers (2003) did not identify feedback and performance monitoring as influential variables to effective innovation diffusion in his organizational model. While it may be implied during the knowledge, persuasion and decision stages, its importance, as revealed in this study should be elevated. Data suggested that it is an influential variable that needs to be considered early in the planning stage to ensure feedback and performance monitoring is available throughout the diffusion period.

Recognition

The final dimension of particular interest in the persuasion stage is the influence of *recognition*. Although not identified by Rogers as an influential variable in either of his diffusion of innovation models, this study revealed that *recognition* was perceived as a valuable source of feedback and motivation which ultimately enhanced enthusiasm for the innovation. In effect, recognition may be related to feedback and results as praise or congratulations may be based on good results. Overt recognition such as thank you cards from patients and displaying gratitude to peers were methods reported in this study. As described by participants, recognition can be as simple as at the end of one of

your meetings saying "thanks guys for your input because you know what, together we are really going to make a difference to patient care" (I-103). In terms of Rogers' five attributes of the innovation, recognition may be perceived to enhance the observability of the innovation which has been associated with increasing the rate of innovation adoption (Berwick, 2003).

In addition to the observability of the innovation, other attributes such as complexity, compatibility, trialability, and relative advantage of the innovation are also reported to influence rate of adoption mediated by the favourable perception of the innovation by the potential adopter (Escoffrey, Glanz, & Elliot, 2007; Geibert, 2006; Sanson-Fisher, 2004; Counte & Meurer, 2000; Steckler et al., 1991) and affect how an individual is persuaded. Grol and colleagues reported in their meta-analysis of studies examining implementation of clinical guidelines and protocols that adoption was more likely if they (guidelines or protocols) were of low complexity, trialable and clear (Grol, Dalhuijsen, Thomas, Veld, Rutten, & Mokkink, 1998). It is interesting to note these researchers' healthcare studies span nearly two decades but all conclude similar results. This lends powerful support to Rogers' work (Rogers 1995, 2003) and its particular relevance in healthcare.

Decision

The decision to adopt the innovation was described by Rogers (2003) as taking place when an individual engaged in activities that led to a choice of adoption or rejection. Intuitively, this could occur during any stage of the diffusion process. Described in this study as the "opportunity to be involved" (I-105), findings suggested that decision-making was directly influenced by the extent to which the planning and testing stages enticed staff to become engaged. Staff engagement was reported to directly influence whether individuals would decide 'for or against' the QI initiative. An example provided in this study related to clinicians adopting and implementing a standardized Provincial asthma protocol. The decision not to use it and its subsequent poor 'use profile' was noted to be as a result of no staff engagement during its development and customization. A second feature influencing the decision to adopt or reject a

QI initiative was reported by Rogers (2003) as being the degree of observability of the innovation. Observability is a characteristic that has been reported to be of more influence for some individuals typically related to adopter characteristics. Described by Rogers (2003), the rate at which individuals buy-in to the innovation is in part, due to whether they display characteristics of innovators, early adopters, early majority, late majority or laggards (p. 170).

Observability of the innovation is linked to the testing stage discussed earlier. Testing of the innovation through the PDSA process was identified as a valuable mechanism to reduce negative perceptions against innovations. Findings from this study also indicated that observability could be enhanced through observation of peers' action or inaction. This vicarious experience reportedly provides sufficient information for adoption decisions (Rogers, 2003). Alternatively, as previously highlighted in this study, credibility of an innovation as well as the influence of feedback and performance results were positioned as powerful mechanisms that could sway people into deciding to adopt. It is therefore not surprising that dimensions previously included in earlier stages in the proposed modified model, re-appear as being relevant to the decision and implementation stages.

Implementation

In the modified model, I proposed the stage of *implementation* in juxtaposition with the *exposure-implementation process*. Its placement following 'decision' was based on the findings from this study which indicated implementation strategies were dependent on innovation magnitude and complexity. An example provided in this study related to participants' experience with implementing a system-wide e-health program, *Firstnet*,that entailed the implementation starting on a 'go-live' day. While there was some customization and testing conducted, an implementation date was set that involved all ED staff and physicians to start using the new electronic technology. Findings from this study therefore suggest that while PDSA cycles have a place in implementing some QI initiatives such as clinical protocols, there are occasions when mass implementation must also occur. Therefore, implementation frameworks must be

sufficiently flexible to accommodate various degrees of QI complexity and magnitude in the emergency setting.

Confirmation

The *confirmation* stage originated from Rogers' (2003) individual diffusion of innovation model. It is described as the stage when individuals seek reinforcement of the decision already made and it is at this time that decisions may be reversed if there is conflicting evidence supporting their decision (Rogers, 2003). Findings from this study relating to the confirmation stage are interesting… because there are none. Sometimes in research, it is what does not get said that stimulates more discussion. As the literature remarks, not all innovations should reach the routinization stage because they simply do not meet the needs of the issue that they are meant to be addressing and therefore it is more cost effective to cease implementation (Rogers, 2003). This seems to be an important decision to make, and one which was not raised in this study. While it is possible that the lack of findings arose from an oversight on the part of the participants, this was unlikely as there was not a single reference to the confirmation decision. Another possible explanation may be that the decision to continue or cease is embedded into routine practice and thus did not receive conscious attention. A third possible explanation may be that the process of confirmation is not a recognized step in QI implementation in the ED and rather than making an overt decision to cease the innovation when it is not meeting expectations despite all efforts to make it work, it is simply allowed to drift until it is no longer used.

Discussion in the literature of reasons for discontinuance referred to the attributes of the innovation (Geri & Naor-Elaiza, 2008), particularly perceived ease of use, perceived usefulness and its value. Similarly, a lack of fit with the organization and insufficient supportive technology were purported as reasons for discontinuance of a group support system in a large organization (Pollard, 2003). While these studies align with Rogers and this study's findings on attributes of an innovation and their role in

long-term use of the innovation, there appears to be a scarcity of literature exploring how, by whom and when confirmation can lead to discontinuation.

Clarification & Routinization

An alternative route for the innovation is that it meets needs and regardless of whether a conscious decision is made for its continuance, its spread is encouraged throughout the intended audience. Rogers described the clarifying stage in his organization model as occurring when "the innovation is put into more widespread use in an organization, so that the meaning of the new idea gradually becomes clearer to the organization's members" (Rogers, 2003, p. 427). Thus, clarification in the proposed modified diffusion of innovation model for a complex healthcare environment is integrally linked to the testing stage identified in stage three (customization and testing). Findings from this study referred to this as ongoing PDSA cycles that gradually increased exposure of the innovation to more individuals, eventually securing a critical mass. Participants referred to achieving a critical mass, after which findings indicated that implementation of the innovation was expedited as word got round and favourable impressions were formed. Defined by Rogers (2003), the achievement of a critical mass is "the point when enough individuals in a system have adopted an innovation so that the innovation's further rate of adoption becomes self-sustaining" (p. 343). The field of enquiry is rich in studies on the role of critical mass in diffusion of innovations. Achievement of critical mass using a new transport system was used as a determination of successful transition from usership of the old to the new system (Sutanto, Kankanhalli, Tay, Raman, & Tan, 2008). Similarly, based on the literature, critical mass was included as a decision point in the modified diffusion of innovation model in a complex healthcare environment. Based on whether a critical mass has been achieved, two paths of action may occur. First, if critical mass has not yet been achieved, there would be a return to the exposure-implementation cycle where there is continuing focussed attention on the innovation. As more individuals, portraying late majority and laggard adopter characteristics, make the decision to adopt and implement the innovation critical mass will eventually be achieved.

Alternatively, if critical mass has been achieved, participants indicated that frontline staff and physicians became opinion leaders, replacing clinical champions as the catalyst for wide-spread diffusion. During this replacement period, findings indicated that clinical champions remained available as the go-to person for education and questions. Feedback and results remained a critical feature during this period as an additional source of persuasion and motivation. Recognition was also reported as valuable during this stage. Participants suggested that without these dimensions actively in place, at the end of the intensive awareness period, reported as nine to twelve months, there was slippage in innovation use and the user profile dropped off. To address slippage and achieve routinization, data indicated the need for a continued focus on feedback and performance results over a period of 18-24 months, to be accompanied by education sessions for update and refresh purposes. These findings mirror those of Nelson, Batalden, and Godfrey (2007) who recommended that the duration of an implementation action-plan should extend to 24-months. However, as noted in this study, the timeframe for focussed activity in healthcare is relative to the nature of the clinical condition. The example of the implementation plan for diffusing the sepsis protocol was used to illustrate this; where the timeline was extended beyond 24-months due to the seasonal nature of the illness.

Section Two: Discussion Focussing on Implementation Audit Checklist

The implementation audit checklist designed for testing in this study was composed of a list of factors modified from a Swedish organizational change management model (Molfenter et al., 2005). Refer to Appendix 1. The relevancy, value and existence of each factor were considered separately by participants within the context of the ED from which several encouraging findings emerged. While some criticism was levelled at the checklist for being too long, findings suggested that all but one of the factors were either critical or helpful to implementation of QI initiatives in the ED. This finding supports the Swedish model suggesting that there exists a generic set of features underlying implementation that crosses disciplines, specialities and levels of authority in healthcare. Furthermore, findings from this

study clearly highlighted the checklist's potential usefulness not only in all areas of healthcare but also in other industries outside of healthcare.

The perceived value of each factor was rated through participants assigning either a 'critical', 'helpful' or 'not useful' value to each factor. Seventeen out of the thirty-nine checklist factors were rated as critical by at least four out of six participants (see Table 8). The role of critical success factors in organizational change has been widely researched in the manufacturing industry where the role of flexibility, diligence in planning, clarity of goals and purpose, availability of resources, empowerment, rewards and clear leadership were cited repeatedly in the literature as being critical to effective organizational change (Badri, Davis, & Davis, 1995; Dey, 1999; Finney & Corbett, 2007).

Although not as widely researched in the healthcare setting, results using Bayesian statistical methods to identify critical success factors indicated that engagement, clarification of problem and analysis, leadership, resources, flexibility of design and evidence of effectiveness were all associated with increased effectiveness of organizational change (Gustafson et al., 2003; Olsson et al., 2003). Albeit based on the experiences and perspectives of a small group of purposively sampled ED staff, findings from this study provided consistent support for the critical success factors previously identified in the organizational change literature.

Awareness and inclusion of critical factors in the checklist was reported to be advantageous from two perspectives. First, findings suggested that it may assist clinicians to triage which initiatives to take on. Thus by using the checklist as a decision-making tool in the agenda setting stage, it would be feasible to abandon a plan that required a level of support and resources that were not available. Second, in addition to a strategic use of the checklist, findings indicated that it could help with brainstorming and planning. As remarked in this study, "if it were known that we didn't have a critical factor in place, then it gives you a chance of finding whether you can work without it or if you have to have it in place before moving forward". The early termination of a plan may avoid unnecessary wasting of resources which is

often seen in failed implementation efforts (Jarlier & Charvet-Protat, 2000). In face of the current national economic pressures, the use of the implementation audit checklist as a triage tool may create efficiencies within healthcare through optimal and effective deployment of resources. The checklist was also reported to be a support for those individuals whose passion for creative ideas on how to improve quality care sometimes overshadowed the reality of 'figuring out how to do it'. In this situation, an audit checklist that required the user to consider separately each of the critical factors may serve as a 'reality check'. This finding was similar to Scrivens (2000) who noted that checklists had the capacity to force individuals to see what really is, rather than what they want to see. However, a difficulty may arise in using the checklist as a decision-making tool as noted in this study, if there is no option but to implement an innovation when the order has been given by a key stakeholder, regardless of whether there is the likelihood that the implementation will fail.

Use of the checklist was also perceived favourably for its stepwise format that provided healthcare providers with a roadmap for effective implementation practice in the ED. This was seen as particularly useful in the complex emergency environment where participants reported the difficulty of being self-organized when trying to balance the duties of a bedside practitioner and leadership duties with the complexity of designing, planning and implementing new QI initiatives such as clinical protocols or e-health technologies. The 'prompt' characteristic afforded by the checklist was supported in the literature where a checklist was described as a mnemonic device which reduced the chances of forgetting to check something important (Hart & Owen, 2005).

Although the checklist was perceived very favourably in this study, several recommendations emerged to increase the effectiveness of the checklist. The first related to a revision of the checklist to ensure the use of familiar and appropriate terminology; there was the perception that statements were theory-driven and on occasion, repetitive. A second recommendation related to adding items that were under-represented i.e., communication, interdisciplinary/collaborative improvement teams and on-going evaluation and feedback. The third recommendation related to length of the checklist. Although data

indicated that it would be difficult to eliminate any factors from the checklist, literature suggested that it was important to consider human capabilities as well as human limitations when designing a checklist and to allow this to help determine checklist content (Verdaasdonk, Stassen, Widhiasmara, & Dankelman, 2009). With this is mind, the future design of the implementation audit checklist should consider highlighting critical features as a method of providing focus for its users, rather than physically deleting content that was perceived as helpful. This recommendation ties in with the findings that suggested two versions of the checklist; a brief one-pager and a more comprehensive action plan version. The rationale behind this was reported as accommodating the differing degrees of innovation complexity. A one-pager was suggested as fulfilling requirements of the initial triage function of the checklist while a more detailed version that afforded space to include a detailed implementation action plan was suggested for complex initiatives that had been selected as a priority for action during agenda setting.

A final recommendation regarding checklist format arose as a result of discussing this study's results in the context of Rogers (1995, 2003) models of innovation diffusion. The ease in which this study's findings aligned with Rogers's models indicated an opportunity to use the stages identified in the proposed modified diffusion of innovations in a complex healthcare environment, to provide some sequential order to the checklist. Based on these recommendations, the checklist will be revised.

Clearly, implementation in the ED is highly complex and for it to be effective, a high degree of implementation knowledge and expertise is required. While this study reported that participants were experienced in QI implementation, it was also noted that many healthcare workers do not share this skill set. Thus the advantage of the implementation audit checklist is that it is based on extensive evidence but does not require the same amount of experience to use it. As healthcare in Western Canada becomes more decentralized, it is likely that frontline leadership, bedside clinicians and clinical support staff will have an opportunity to become more involved with work guided by improvement teams. This study suggests that the availability of an evidence-based implementation tool to assist healthcare providers has the potential to improve patient outcomes through better designed implementation. This has tremendous

implications of creating efficiencies in the healthcare system during a time when national economic constraints and an aging population place unprecedented stress on all levels of the healthcare system and those who work in it.

Personal Reflections

Implementation appears to be more iterative than linear, building on the input, results and feedback obtained during gradual 'infiltration' of a new idea into routine practice. While results of this study were categorized into dimensions and then themed, the assignment of dimensions to Rogers' diffusion stages positioned each dimension in a stepwise fashion that created an implementation roadmap for healthcare providers to follow when implementing new QI initiatives. Although stages were presented sequentially in the modified diffusion model, this order may change depending on the magnitude and complexity of the innovation as well as the adopter characteristics of the healthcare providers. The modified model truly acknowledges Rogers assumption of organizational innovation building on individuals' innovation behaviour, evidenced by the inclusion of all elements of the individual model (refer to Figure 8). Intrinsic to the model is the flexibility to skip stages, or dwell longer, depending on the innovation. The increased visibility of planning both in the matching and testing stage (through PDSA cycles) addresses the finding from this study that identified planning as being the longest and hardest aspect of implementing a QI initiative. Findings from this study indicated that planning may take a long time, but without it, there can only be mediocre implementation. Collectively, the model has the potential to explain and support diffusion through the complexity and dynamism of the 21st century ED. As a frontline healthcare professional, this research has resonated deeply with me, both as a nurse and as a quality improvement consultant responsible for implementation of QI initiatives to improve quality care. My personal experience of having a friend whose mother experienced tragic consequences of poor quality care in an ED served as a constant reminder of the reasons for conducting this critical piece of research. The experience that I brought to the study, identified in the researcher bias section of the paper, enabled

me to question knowledgeably, challenge sensitively and interpret results confidently, collectively enhancing the meaningfulness of this research which will directly influence quality of care in the ED.

Conclusions

This study offers insights into the implementation practices of healthcare providers working in EDs in a health region of Western Canada. Findings identified a set of critical organizational conditions and characteristics, behaviours and attitudes of individuals within an organization that were perceived to influence implementation effectiveness. Collectively, these features highlighted the importance of assessing implementation feasibility, ensuring diligence in planning, working in partnership, performing on-going evaluation and intervening to enhance implementation and were presented as overarching themes. Based on Rogers (1995, 2003) diffusion of innovation theory, the proposed modified diffusion of innovation model for a complex healthcare environment provided a platform for discussion of study findings, emphasizing a progressive but flexible approach to QI initiative implementation in the ED. The proposed model also appeared to encompass key features of other implementation frameworks (e.g., Greenhalgh et al., 2004; Stetler et al., 2008; Klein & Sorra, 1996, Kitson et al., 1998). Furthermore, this study has also taken the first step of translating complex implementation theory into applied operational and clinical practice through the development of an evidence-based implementation audit checklist. The checklist, with modifications, was perceived to be a useful stepwise roadmap that was general enough to be relevant to a broad range of QI initiatives from single clinical protocol implementation to more complex ones like patient streaming that involved multiple levels of the healthcare system.

Implications for Practice

There are substantive implications for practice arising from this study at multiple levels of the healthcare system. A key message for policy makers at the Provincial and organizational level of the healthcare system is that development and adoption of evidence-based QI initiatives is not sufficient to enhance quality of patient care. There is a critical need to invest in effective implementation of the QI

initiative. The key message for healthcare providers responsible for the design, planning and implementation of QI initiatives in the ED is that it is imperative that opportunities are sought to work collaboratively across clinical areas and with multiple levels of the healthcare system to move forward implementation of QI initiatives and in doing so, to apply a critical evaluative lens through all stages of QI design, planning and implementation. Finally, a key message for national research funding agencies is that there is a critical need to target funding to research implementation effectiveness in the complex healthcare environment. Results from this study clearly articulate the positive influence afforded by the implementation audit checklist to facilitate translation of implementation theory into clinical practice. However, this checklist must be subjected to rigorous statistical analysis prior to it being embraced as an evidence-based intervention tool to enhance effective QI implementation.

Future Research

Several opportunities for future research arise from this exploratory study of QI implementation in the ED. First, although this study explored the perceived value of factors influencing implementation, the methods employed relied on gathering the perspectives of healthcare providers through primarily qualitative strategies. A logical progression for checklist research is to employ survey research methods to enable more precise quantitative estimation of dimension variance as well as an estimation of relationships among the dimensions. Following confirmatory analysis, the next area of interesting research would be to study the use of the checklist as an intervention using control and intervention groups in a quasi-experimental, mixed methods design. A third opportunity for future research is to conduct a longitudinal prospective study that tracks implementation through to sustainability. The fourth future area of research interest relates to exploration of QI implementation and the use of the audit checklist in various contexts. This includes rural and large urban emergency department contexts as well as in other areas of healthcare beyond the borders of the emergency department, e.g., Provincial ambulance services, intensive care units, medical services and surgical services. On completion of these research activities, it is possible that the implementation audit checklist may be considered an evidence-

based intervention too that is influential in addressing the high incidence of failed QI implementation activities in healthcare. Ultimately, this will assist in ensuring that evidence-based medicine is complimented by evidence-based implementation strategies (Grol, 1997).

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Appendices

Appendix 1 – Implementation Audit Checklist

Instructions on Completing the Checklist

The sepsis protocol is a quality improvement initiative designed to provide enhanced clinical care to the patient presenting with sepsis in the Emergency Department.

The following implementation checklist asks you to consider 16-factors as they pertain to the oversight, design, planning and implementation of the sepsis protocol in the ED.

- The *"Yes/No/Don't Know*" columns refer to your experience of the sepsis protocol work to date.
- When completing the *"In Your Opinion, How Important is this to Implementation"*, use your current experience with sepsis as well as your previous experience/knowledge of other quality improvement initiatives to rate the statements.
- The right-hand column asks you to provide a very brief explanation for your rating or you may simply provide comments. The information you provide will remain confidential.

Please complete and return this checklist within 3 days of receiving it. Thank you.

Return to: Claire Winfield, c/o Dr. PJ Naylor, room 0024b, McKinnon Building, University of Victoria, BC,

or

winfield@uvic.ca

VANCOUVER ISLAND health authority

Guide to Completing this Implementation Audit Checklist:

1. Please save this checklist as a word document to your desktop before completing it.
2. Place the cursor over the box and left click once to make a check mark. To type text in last column, click cursor on grey and start typing.

Thank-You!

	Factor Statements	Yes	No	Don't know	In your Opinion, how Important is this Statement to the Implementation of the Quality Improvement Initiative			Comments/Explanation for your Rating
					Critical	Helpful	Not Important	
1	Source of Ideas							
a.	Key ideas behind the sepsis protocol came from outside your organization.	☐	☐	☐	☐	☐	☐	
b.	If the key ideas came from outside your organization, they have been tailored to meet your organization's needs.	☐	☐	☐	☐	☐	☐	
2	External Influence							
a.	The sepsis protocol is being implemented as a result of external pressure from outside your organization.	☐	☐	☐	☐	☐	☐	
3	Mandate							
a.	Leadership has assigned a change agent/project leader.	☐	☐	☐	☐	☐	☐	
b.	Issue has been clearly defined and needs/tasks outlined.	☐	☐	☐	☐	☐	☐	
c.	Leadership has set high performance expectations	☐	☐	☐	☐	☐	☐	
4	Leadership Goals, Involvement & Support							
a.	Leadership are regularly involved and/or informed.	☐	☐	☐	☐	☐	☐	
b.	Implementation of the sepsis initiative helps meet leadership goals & objectives.	☐	☐	☐	☐	☐	☐	

	Factor Statements	Yes	No	Don't know	In your Opinion, how Important is this Statement to the Implementation of the Quality Improvement Initiative			Comments/Explanation for your Rating
					Critical	Helpful	Not Important	
c.	Leaders have time and resources to support the initiative	☐	☐	☐	☐	☐	☐	
5	Middle Manager Goals, Involvement & Support							
a.	Middle management is regularly involved and/or informed.	☐	☐	☐	☐	☐	☐	
b.	Implementation of the sepsis initiative helps meet middle management goals & objectives.	☐	☐	☐	☐	☐	☐	
c.	Middle management has time and resources to support the initiative.	☐	☐	☐	☐	☐	☐	
6	Funding							
a.	Leaders have committed money to support both implementation & problem solving and/or there is external funding is available to support.	☐	☐	☐	☐	☐	☐	
7	Work Environment							
a	Leader roles support the change(s) arising from the sepsis initiative.	☐	☐	☐	☐	☐	☐	
b.	Organizational structure supports the change(s) arising from the sepsis initiative.	☐	☐	☐	☐	☐	☐	
c.	Incentives are available to support the change(s) arising from the sepsis initiative.	☐	☐	☐	☐	☐	☐	
d.	Staffing levels support the change(s) arising from the sepsis initiative.	☐	☐	☐	☐	☐	☐	
8.	Clinical Champion							
a.	Clinical champion(s) is committed to making the sepsis initiative a success.	☐	☐	☐	☐	☐	☐	
b.	Clinical champion(s) is empowered and is respected by colleagues.	☐	☐	☐	☐	☐	☐	
c.	Clinical champion(s) respects values of staff.	☐	☐	☐	☐	☐	☐	

	Factor Statements	Yes	No	Don't know	In your Opinion, how Important is this Statement to the Implementation of the Quality Improvement Initiative			Comments/Explanation for your Rating
					Critical	Helpful	Not Important	
9	Staff Needs Assessment, Involvement & Support							
a.	Healthcare provider(s) involved with the sepsis initiative know(s) staff needs and have taken steps to address needs.	☐	☐	☐	☐	☐	☐	
b.	Staff leaders have been involved and believe that steps have been taken to meet most staff needs.	☐	☐	☐	☐	☐	☐	
c.	Most staff will support the sepsis initiative.	☐	☐	☐	☐	☐	☐	
10	Tension for Change							
a.	Staff disagrees or dislikes the existing situation re: sepsis and believes change is essential to address the problem.	☐	☐	☐	☐	☐	☐	
11.	Exploration of Problem and Needs							
a.	Members of improvement team talked to many staff and/or patients to understand the problem/needs re: sepsis.	☐	☐	☐	☐	☐	☐	
b.	Members of improvement team have personally experienced the problem/needs re: sepsis.	☐	☐	☐	☐	☐	☐	
c.	Data is available on severity of sepsis problem/needs.	☐	☐	☐	☐	☐	☐	
12.	Advantages to Staff & Patients							
a.	Staff and/or patients clearly understand how the sepsis initiative addresses the problems or needs.	☐	☐	☐	☐	☐	☐	
b.	Staff and/or patients feel that it has many more advantages than disadvantages and that it meets their needs well.	☐	☐	☐	☐	☐	☐	

13.	Flexibility of Design							
	Proposed sepsis initiative can (without hurting effectiveness) be easily modified to make it more appropriate for your ED setting.	☐	☐	☐	☐	☐	☐	
14.	Complexity of Implementation Plan							
a.	Implementation plan is simple and staff understands it.	☐	☐	☐	☐	☐	☐	
b.	Implementation schedule & task assignment are detailed and clear.	☐	☐	☐	☐	☐	☐	
c.	Small tests of change or a pilot test(s) are used.	☐	☐	☐	☐	☐	☐	
15.	Staff Changes Required							
a.	If job changes are required, they are few and clear.	☐	☐	☐	☐	☐	☐	
b.	Staff has needed skills to implement sepsis protocol.	☐	☐	☐	☐	☐	☐	
c.	Excellent training and education materials have been developed.	☐	☐	☐	☐	☐	☐	
d.	Education & training sessions are available.	☐	☐	☐	☐	☐	☐	
16	Monitoring & Feedback							
a.	A specific method exists to get honest staff and/or patient feedback, which is then used to improve the sepsis initiative.	☐	☐	☐	☐	☐	☐	
b.	Performance data relating to the new sepsis protocol is collected.	☐	☐	☐	☐	☐	☐	

At your scheduled interview with Claire Winfield (primary investigator), you will have the opportunity to discuss the influence of this checklist and the relevancy of the evidence-based factors in the context of the Emergency Department setting as well as any other thoughts/ideas relevant to implementation of the sepsis protocol/quality improvement initiatives.

Now please return this checklist to:

Claire Winfield, c/o Dr. PJ Naylor, room 0024b, McKinnon Building, University of Victoria, BC,

or

as an attachment to: winfield@uvic.ca

Thank You for Your Participation!

Appendix 2 – Semi-Structured Interview Schedule

PARTICIPANT INFORMATION

Will you tell me a little about yourself? (prompts: occupation, scope of work, what you do)

Will you tell me a little about your experience of implementing QI initiatives in the ED?

How would you describe senior and middle management in this organization?

INFLUENCE OF CHECKLIST

Once you had completed this checklist, what was your initial reaction?

Have you used checklists before in healthcare? Tell me about it.

Has completing this checklist had any influence on you as a staff member involved with designing, planning and/or implementing the sepsis protocol or any other QI initiative?

CONTEXT OF FACTORS

Will you tell me about your experience of your work implementing the sepsis protocol and other QI initiatives that you have been involved with?

- prompts: what was important to you when you were implementing the initiative
- are the factors listed in the checklist relevant in the context of ED

Is there anything missing from the checklist that you feel has influenced the sepsis or other QI initiatives?

FUTURE USE OF CHECKLIST

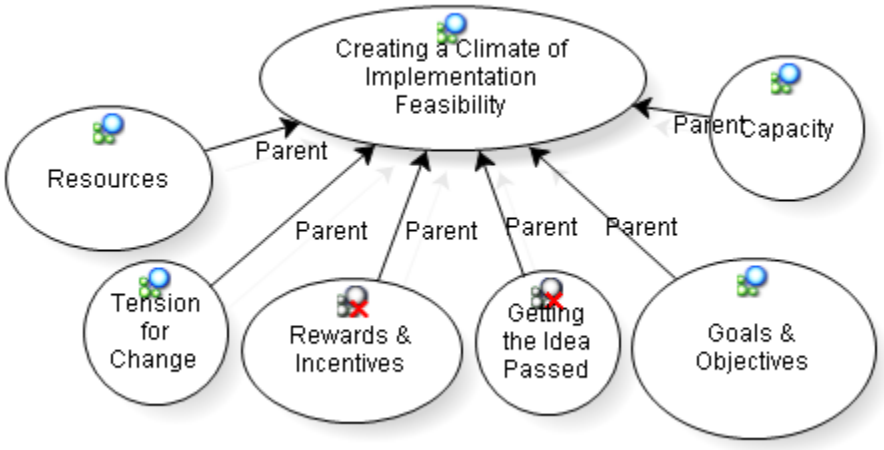
Would you use this checklist again to help you design, plan and implement any other quality improvement initiative in the ED? If so, would you make any changes to its format or content?

If you were to use the checklist again, at what point in the process would it be most useful?

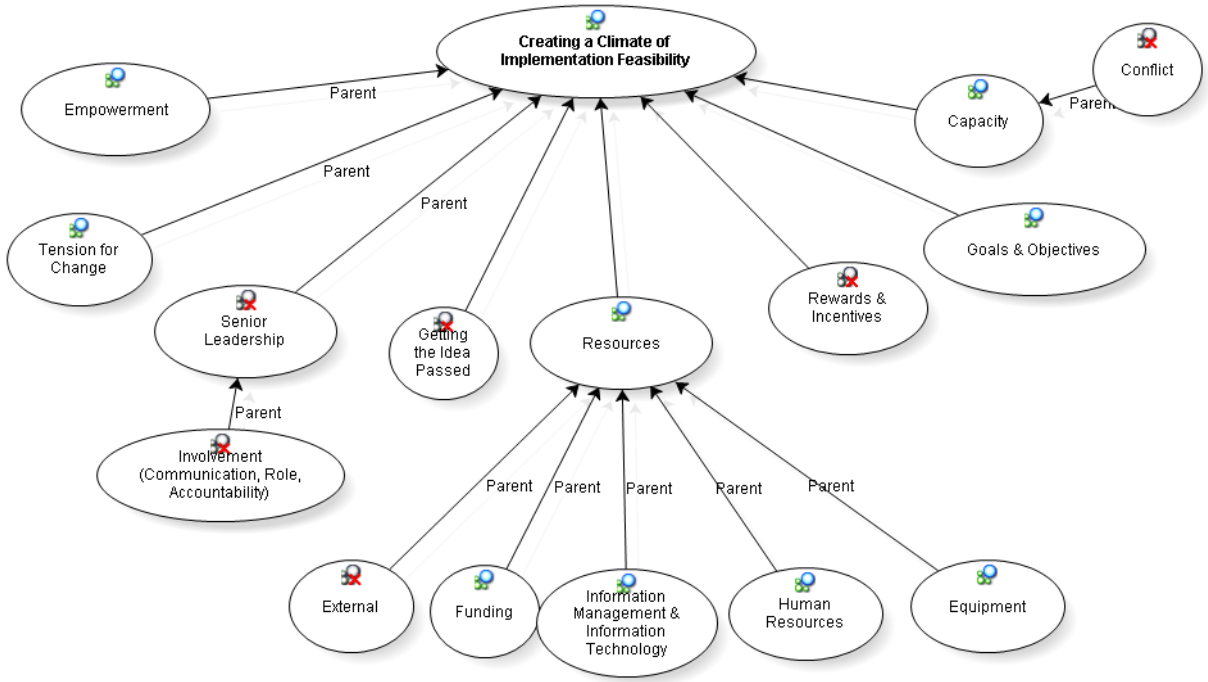
Who would you envisage using a checklist like this?

Appendix 3 – Sample of Iterative Coding of Theme 1 using NVIVO Modeling

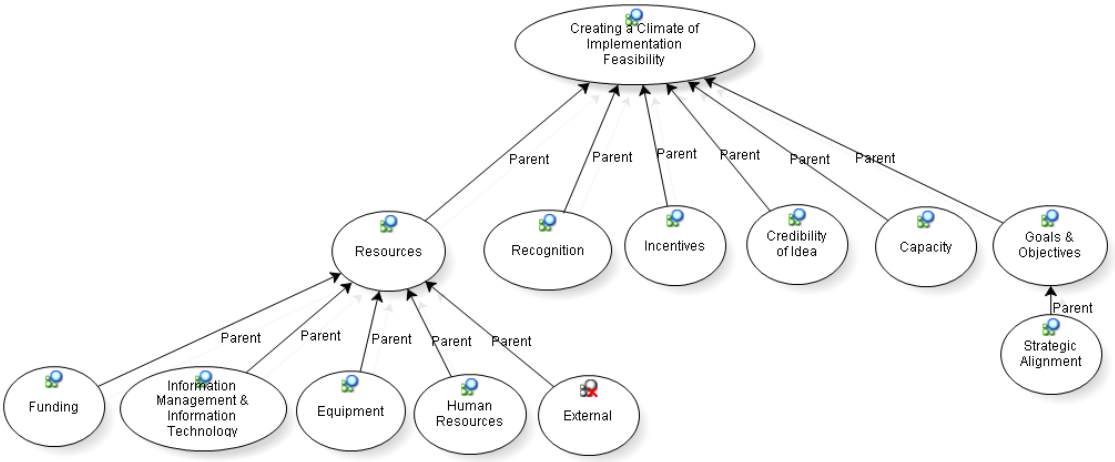
Stage 3 Coding



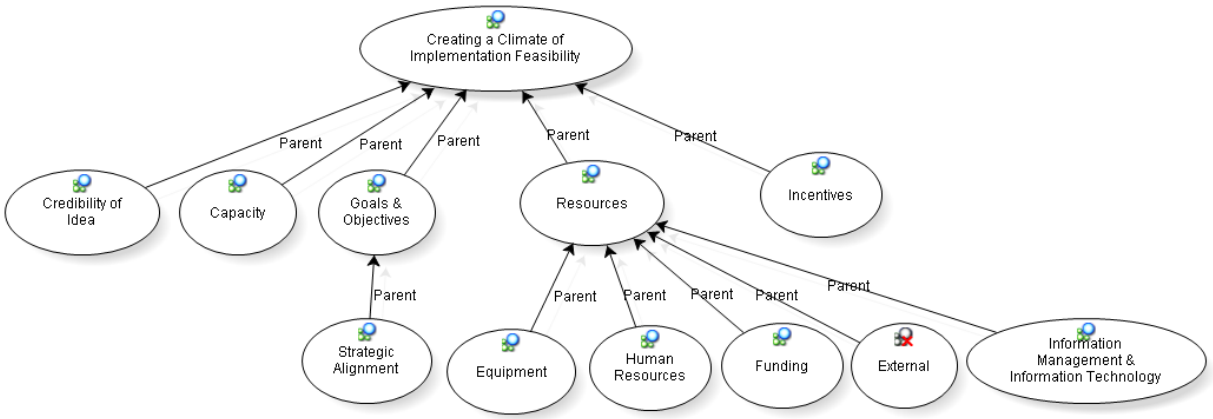
Stage 4 Coding



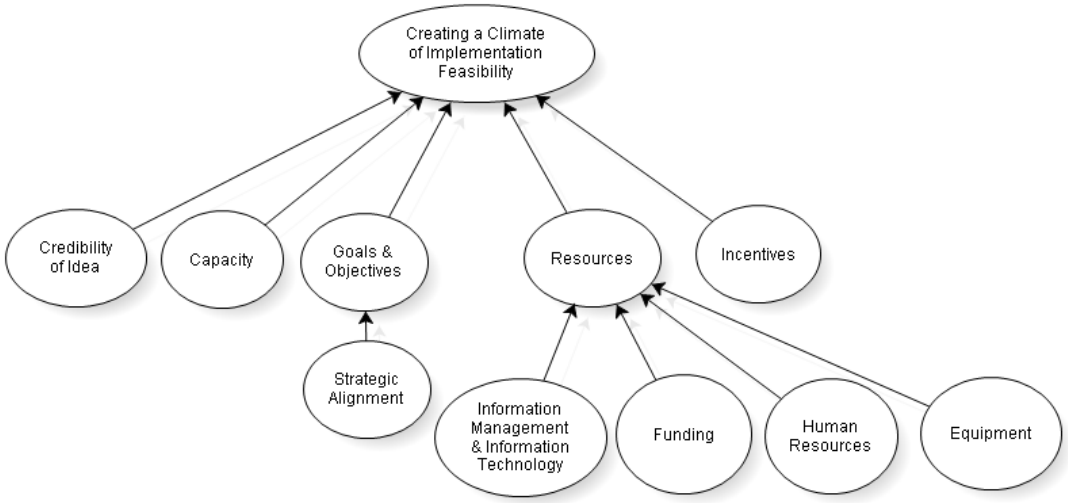
Stage 7 Coding



Stage 8 Coding



Stage 9 Final Coding



Appendix 4 –Definitions of NVIVO Dimensions

Theme 1: Creating a Climate of Implementation Feasibility

Credibility of Idea: Reputation or status of the idea.

Capacity: Volume of workload; ability to receive and absorb new information.

Goals & Objectives: Goal: A pre-determined target(s) that individuals work toward.

Strategic Alignment: The process of linking QI innovation strategies with organizational vision, goals and objectives.

Resources: ‘”The means available to achieve an end” (Canadian Oxford Dictionary, 1998)

Incentives: A motive to encourage participation or engagement.

Theme 2: Creating a Climate of Focus and Flexibility in Planning

Adaptability: Able to be modified to fit into/with existing conditions or settings.

Complexity: A determination of how complicated and/or involved an initiative is.

Purpose: The reason for which something is being implemented.

Roles & Task Identification: A clear expression of activities that need to be done and individuals’ roles & responsibilities relating those activities.

Timing: Scheduling of activities relating to the initiative.

Trialability: The process of testing the ability, quality and performance of an innovation before reaching a final decision about whether to spread or terminate the use of the initiative.

Theme 3: Creating a Culture of Inclusiveness through Partnerships

Engagement: Involvement of individuals, regardless of rank or discipline within the organization.

Staff: Individuals within the organization who do not hold formal leadership positions.

Management: Individuals within the organization who hold formal leadership positions.

Clinical Champion: A practising clinician who leads an idea for a cause or on behalf of another.

Project Leader: An individual who leads the way and others follow, specifically in the context of leading a project.

Resistance: Attitude toward the initiative, displayed by negativity, lack of motivation or enthusiasm to become involved, working against attempts to implement the initiative.

Education: The process of being taught with the intent to increase knowledge and expertise relating to an initiative.

Empowerment: A process that gives staff and management autonomy, discretion and decision-making responsibility.

Communication: The exchange of information.

Recognition: Acknowledgement in appreciation of a service, achievement and/or ability.

Theme 4: Creating a Climate of Mandating Evaluation

Current State Analysis: Exploration of the current situation (relating to the issue or problem) prior to the initiative being implemented.

Tension for Change: Feeling a sense of urgency about the need to change something relating to professional practice &/or patient care.

Performance Indicators: Measures or outputs relating to the initiative.

Data Collection: The process relating to how, when and from where data is collected.

Results & Feedback: Sharing of information and results about process and outcomes relating to the initiative.

Post-Implementation Review: Reflection on the implementation process once the initiative has become routine practice.

Theme 5: Intervening to Enhance Effective Implementation

Context: The healthcare environment in which implementation the QI initiative is being considered; e.g., the emergency department.

Application: Process relating to when the implementation audit checklist may be used.

Brainstorming: Seeking solutions to an issue or need by discussing ideas, prompted by contents of the implementation audit checklist.

Familiarity: The state of being well known.

Raising Awareness: Bringing to the forefront information and/or knowledge of features of implementation.

Auditing to Assess Readiness: Assessing strengths and weaknesses of QI implementation preparation and planning processes.

Strategic Planning: The process of QI planning for the future in a skilful way.

Usership: Individuals using the implementation audit checklist.

Design: The selection, arrangement and formatting of the implementation audit checklist, including use of appropriate language.

Omitted & Under-Represented Features: Information identified as missing or insufficiently represented in the implementation audit checklist.

Appendix 5 –Perceived Value Ratings of 39 Implementation Audit Checklist Statements

Checklist Question	Implementation Factor	Frequency Count of 'Critical' Ratings	Frequency Count of 'Helpful' Ratings	Frequency Count of 'Not Important' Ratings
16b.	Performance data relating to new initiative is collected	6	0	0
3b.	Issue has been clearly defined & needs/tasks identified	6	0	0
13.	Proposed sepsis initiative can (without hurting effectiveness) be easily modified to make it more appropriate for your ED setting.	6	0	0
1a.	If key ideas came from outside your organization, they have been tailored to meet your organization's needs.	5	1	0
4c.	Leaders have time and resources to support the Initiative.	5	1	0
6a.	Leaders have committed money to support both Implementation and problem solving and/or there is external funding available to support.	5	1	0
7a.	Leader roles support the change(s) arising from the sepsis initiative.	5	1	0
15c.	Excellent training and education materials have been developed.	5	1	0
15d.	Education and training sessions are available.	5	1	0
8a.	Clinical champion(s) is committed to making the sepsis initiative a success.	5	1	0
8b.	Clinical champion(s) is empowered and is respected by colleagues.	5	1	0
14a.	Implementation plan is simple and staff understands it.	5	1	0
11c.	Data is available on severity of sepsis problems/needs.	5	1	0
5a.	Middle management is regularly involved and/or informed.	4	2	0
5c.	Middle management has time and resources to support the initiative.	4	2	0
8c.	Clinical champion(s) respects values of staff.	4	2	0
9a.	Healthcare provider(s) involved with the sepsis initiative know(s) staff needs and have taken steps to address needs.	4	2	0
9b.	Staff leaders have been involved and believe that steps have been taken to meet most staff needs.	4	2	0
14c.	Small tests of change or a pilot test(s) are used.	4	2	0
15b.	Staff have needed skills to implement sepsis protocol.	4	2	0
16a.	A specific method exists to get honest staff and/or patient feedback, which is then, used to improvement the sepsis initiative.	4	2	0
14b.	Implementation schedule and task assignment are detailed and clear	3	3	0
3a.	Leadership has assigned a change agent.	3	3	0
4a.	Leadership are regularly involved and/or informed.	3	3	0
7d.	Staffing levels support the change(s) arising from the sepsis initiative.	3	3	0
9c.	Most staff will support the sepsis initiative.	3	3	0
5b.	Implementation of the sepsis initiative helps meet middle management goals and objectives.	3	2	1
15a.	If job changes are required, they are few and clear.	2	4	0

Checklist Question	Implementation Factor	Frequency Count of 'Critical' Ratings	Frequency Count of 'Helpful' Ratings	Frequency Count of 'Not Important' Ratings
3c.	Leadership has set high performance expectations.	3	2	1
12a.	Staff and/or patients clearly understand how the sepsis initiative addresses the problems or needs.	3	2	1
7b.	Organizational structure supports the change(s) arising from the sepsis initiative.	3	2	1
7c.	Incentives are available to support the change(s) arising from the sepsis initiative.	1	5	0
10.	Staff disagrees or dislikes the existing situation re: sepsis and believes change is essential the address the problem.	1	5	0
11a.	Members of improvement team talked to many staff and/or patients to understand the problem/needs re: sepsis.	2	3	1
11b.	Members of improvement team have personally experienced the problem/needs re: sepsis.	1	5	0
12a.	Staff and/or patients feel that it has many more advantages than disadvantages and that it meets their needs well.	1	5	0
4b.	Implementation of the sepsis initiative helps meet leadership goals and objectives.	1	4	1
1a.	Key ideas behind the sepsis protocol came from outside your organization.	0	4	2