

‘What works’ in organisational change and business improvement?

A Rapid Evidence Assessment

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national **AGENCY** POLICING

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Note to the reader

- This report is intended primarily for readers interested in the technical detail of the process of reviewing the literature on organisational change in a systematic way. Readers more interested in the key practice implications may find these in the executive summary or may find the companion summary paper helpful. The summary paper is available on the Police OnLine Knowledge Area (POLKA) and the NPIA website.
- Practitioners may also find it useful to look at the Continuous Improvement Self-Assessment Matrix which was developed based on the review findings and subsequent workshops with practitioners. The matrix describes the enablers of continuous improvement, along with the behaviours needed to achieve higher levels of organisational performance and development. CI-SAM is available to the police service via POLKA.

Summary

Background

- This report presents the cumulative findings of two Rapid Evidence Assessments (REAs) designed to explore what is known about effective organisational change and business improvement practices. The full document is intended primarily for readers interested in the technical detail of a systematic approach to reviewing literature. A companion summary report provides a standalone overview of the key findings and implications for practice and is available on POLKA and the NPIA website.
- The findings from these reviews have been used to build a maturity model articulating what successful change might look like in a force and setting out four key enablers to help achieve change, together with various features and behaviours that might be expected at different levels of change maturity. The Continuous Improvement Self-Assessment Matrix has been designed together with change leads in forces and can be used specifically to help forces assess their current change capability and focus on potential areas for development.
- The first REA was conducted within a tight timescale and was limited to existing systematic review evidence. This evidence did not allow any statements to be made about 'what works' in organisational change or business improvement. Similarly, no specific factors could be said to be 'critical' to successful change.
- In response to the lack of experimental evidence, the second REA was carried out, this time relaxing the inclusion criteria. The second REA was conducted over a two-month period, following systematic principles, but is not exhaustive and is likely to be biased towards published sources rather than grey (unpublished) literature.

Findings

- No robust experimental evidence in the area of organisational change and business improvement was identified in either of the reviews. Some 'promising' evidence was identified and any potential enablers associated with these studies are highlighted.

Potential enablers for continuous improvement

- Engagement: The importance of staff feeling **actively involved** in changes and frequent, relevant organisational communication are highlighted as aiding successful implementation of change programmes.
- Contextual factors: Evidence suggests that tailoring interventions to address **prospectively identified** barriers to change can lead to more successful implementation of change programmes.
- Leadership: Consistent evidence was found to suggest leadership is an important enabler for successful CI. Important elements of leadership are: involving staff in decisions, providing staff with direct support from supervisors and ensuring stability of supervision.
- Resourcing: Evidence for resourcing as an enabler was consistent. Evidence suggests that a severe lack of financial and personnel resources can be a barrier to successful change, but adequate resourcing alone is not sufficient to create successful change.

Approaches to organisational change and business improvement

- There are a variety of named approaches and related tools for organisational change and business improvement (e.g. Lean, Six-Sigma, Kaizen, Just-In-Time (JIT) and Total Quality Management (TQM)). While different techniques might be proposed for assessing the problem or collecting evidence, the overall processes are similar, broadly iterative and contain the following stages:
 - Identifying a problem;
 - Assessing how to resolve the problem;
 - Acting on your assessment, and;
 - Evaluating the impact of your solution.
- The similarities are likely to stem from common origins in what is often described as the scientific method or the research process: develop theory, articulate hypotheses, collect data to test hypotheses, analyse data, return to theory.¹
- None of the included papers empirically compared the impact, or relative merits of, different approaches to change (e.g. Six-Sigma compared with Just-In-Time, Lean, Kaizen, etc.), although arguably these methods are so

¹ Sherman (1998), Federal Judicial Center (2000), Scott (2000), Field (2009).

similar that any direct comparison would be inappropriate.

- Essentially all the approaches identified follow the 'Deming cycle' of PDSA (plan; do; study; act – formerly PDCA: plan; do; check; act)². Measurement and assessment of variance is an integral part of the 'Deming cycle' (otherwise known as statistical process control) and could be considered as the basis of all the approaches.
- Developing sufficient analytical capability to collect baseline data and evaluate the impact of any change is frequently overlooked as a key aspect of any business improvement programme.
- Analytical capability is inherent to any Deming inspired approach: without it organisational improvement cannot take place. Though it is implicit, it was not highlighted as a standalone critical success factor.

Conclusion: organisational change as an extension of problem-solving?

- Seen in this light, organisational change and business improvement in policing can be viewed as an extension of existing problem-solving capability already well established in parts of policing (e.g. National Intelligence Model tasking and coordinating; neighbourhood policing).
- Successfully embedding continuous improvement within the police service can build on existing problem solving and analytical capability, focusing on different areas of police business.

Key implications for practitioners

Change programmes may be more successful when:

- Staff are actively engaged in the change process: they feel change is something done with them, not done to them;
- Potential obstacles to change are identified, and mitigated for, before the changes are made;
- Staff are supported by a consistent leadership team throughout the change process;
- Sufficient resources are available to those managing the change project to ensure delivery.

Practical considerations should include how to ensure:

² Boaden et al. (2008).

- early, and continued consultation with business areas likely to be impacted by the business change programmes;
- staff on the front line identify any barriers they see to proposed changes, and these issues are responded to through adaptation of the programme plans or the provision of other support;
- a consistent and supportive management structure is in place for the duration of the change programme;
- the change programme clearly identifies its resource requirements and is provided with the necessary time/ money/ people to achieve its aims.
- the necessary stages in the chosen change process are followed, including proportionate analysis and assessment of benefits.

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'What works' in organisational change and business improvement?

1. Introduction

The police service is currently facing a considerable challenge: to maintain service delivery in the light of substantial budget cuts. The service needs to be able to respond flexibly to adapt to the economic climate. Many forces are adopting business improvement techniques to examine current practices and explore where there may be scope to change processes to release savings. In some cases this requires large scale organisational change, shifting from operating in a culture where resources were plentiful and financial management was the preserve of headquarters staff, to one where they are scarce, tightly controlled and all staff are being asked to take some responsibility for efficiency savings.

The NPIA Research Analysis and Information Unit (RAI) were commissioned to establish what is known about successful organisational change and business improvement to support the changes forces are being asked to make and inform NPIA programme activity in this area. This paper presents the methods used and cumulative findings of two Rapid Evidence Assessments (REAs) designed to examine what is known about effective organisational change and business improvement practices. A summary paper presenting key findings from these REAs and implications for practice is available here ([summary report](#)).

Practitioners may also find it useful to look at the Continuous Improvement Self-Assessment Matrix ([CI-SAM](#)) which was developed based on findings from the REAs and workshops with practitioners. The matrix describes the elements necessary to achieve continuous improvement, together with a clear indication of the types of behaviours that should be in place in order to achieve higher levels of organisational performance and development.

The first REA was conducted within a very tight timescale and was limited to systematic review evidence in order to meet time constraints. From 797 references identified by the searches, this 'review of reviews' identified 5 relevant papers which together cover a limited pool of robust experimental

studies.³ In response to the lack of experimental evidence on this subject RAI carried out a second REA, this time relaxing the inclusion criteria to include individual evaluative studies with a *minimum* of a before and after measure.

The second REA was conducted over a two-month period, following systematic principles, but is not exhaustive and is likely to be biased towards published sources rather than grey (unpublished) literature. The time constraints inevitably resulted in a tightly restricted scope, limited to published evidence for which electronic abstracts were available and contained within databases held by the National Police Library⁴ or obtainable from the British Library by the cut off date. The REA only covered papers published in the last twenty years, resulting in a risk that any older 'classic' studies of organisational change or business improvement may not be included.

Over 11,000 references were identified by the initial searches for the second REA, and after sifting these abstracts, 178 full papers were requested. Of these, 134 were received by the cut off date. Further review of these papers found only 36 papers met the inclusion criteria (representing 0.3% of initial abstracts identified, and 27% of papers received).

This paper draws together the findings from both REAs and is therefore based on a total of 41 papers, 5 studies identified in the first 'review of reviews' together with 36 papers from the second REA.

2. An overview of the available evidence on organisational change and business improvement

The REAs found that high quality experimental evidence on organisational change and business improvement is scarce across all sectors. The majority of evidence is limited to single case studies with simple pre and post test measures, control sites are rarely used.⁵ Despite these limitations all of the case studies identified by the REAs described their change programmes as

³ Full details of the search and sift strategy are set out in Annex A.

⁴ Staff at the National Police Library searched the following databases: CSA Illumina; Emerald/ Emerald Management First; EBSCO Host; Medline; Web of Knowledge/ Web of Science.

⁵ Full design details of all the included studies are set out in Annex C.

'successful'. There are important considerations in terms of the reliability and validity of these findings including:

- Impacts of interventions were typically assessed over a short follow up period, meaning the sustainability of change was rarely measured;
- There is a likelihood of publication bias, i.e. interventions that had no impact are much less likely to be offered as case studies, or published in journals;⁶
- In some instances, the success of interventions was measured by estimates (e.g. projected cost savings), rather than empirical data;
- It was not always clear whether financial savings attributed to interventions took into account the costs of the intervention itself;
- In general, case studies tended to focus on how interventions had been implemented (e.g. detailing the steps of the approach) and the processes that had been followed;
- In some cases different change programmes were being run simultaneously, making it impossible to attribute the outcomes to a particular programme.

Most importantly, none of the included papers tested the relative importance of different factors (e.g. leadership, resources, teamwork) in the success of change programmes. Similarly, none of the included papers empirically compared the impact, or relative merits of, different approaches to change (e.g. Six-Sigma compared with Just-In-Time, Lean, Kaizen, etc.), although it could be argued that these are so similar that they are not appropriate to compare.

Included papers were drawn from a variety of areas, including two papers on organisational change in policing and five papers on public sector change more generally. However, the majority of papers were drawn from healthcare, manufacturing and business/management. The extent to which the findings of these REAs can be generalised to a policing context is therefore open to debate.

⁶ Hopewell et al. (2009).

3. What works in organisational change and business improvement?

A variety of approaches to organisational change and business improvement are described in the papers. The most frequently discussed approaches are Lean and Six-Sigma. Other approaches include Just-In-Time (JIT), total quality management (TQM), business process reengineering (BPR) and Kaizen. Across the included literature a variety of potential success factors are also identified. This section sets out what is known about 'what works?', together with associated success factors, using the Maryland framework which grades the quality of evidence into four distinct categories based on the quality of study design: evidence that is sufficiently robust to determine 'what works' or 'doesn't work', more limited evidence that suggests 'what's promising/unpromising' and then what remains 'unknown'.⁷

What works?

The findings from the papers identified in the REAs are not robust enough to be drawn together to offer any clear evidence of 'what works' in organisational change or business improvement. A recent Cochrane Collaboration Systematic Review⁸ found there were no high quality papers addressing the issue of how to change organisational culture effectively, suggesting that the evidence base in the area of organisational change may not be of a particularly robust standard.

Success factors: As a result of this lack of causal evidence, the papers identified in these REAs do not offer any clear findings on which factors 'work' to facilitate organisational change or business improvement.

What's promising/unpromising?

Promising evidence from one systematic review⁹ found that interventions tailored to **prospectively** identified barriers are more likely to improve professional practice than no intervention, or the simple dissemination of guidelines. There is also promising evidence that strategic human resource

⁷ Full details of the Maryland Scale and grading framework are set out in Annex C.

⁸ Parmelli (2011).

⁹ Baker (2010).

management approaches, including employee empowerment; extensive training, and team based working can lead to performance benefits. However the applicability of these findings to policing is unclear.

Evidence from one longitudinal study found that companies who adopted strategic human resource management (SHRM) practices, namely employee empowerment and extensive training, gained performance benefits (measured in terms of productivity). Team-based working was found to enhance the impact of both of these practices.¹⁰ The same paper found that operational practices, such as total quality management (including Kaizen and continuous improvement) and Just-In-Time production did not enhance company performance (again, measured in terms of productivity). The authors suggest several potential explanations as to why these operational practices did not have a positive impact; the most important being that their study did not measure how well these change programmes were implemented in the companies assessed by the study.

One longitudinal study looked at the survival of companies that adopted ISO 9001 principles,¹¹ finding over a ten-year period that firms using ISO averaged a higher growth in sales and were less likely to go out of business than non-adopters.¹² ISO 9001 is a series of standardised quality management principles for organisations to adhere to (against which they are audited) rather than a discrete improvement programme.

¹⁰ Birdi et al (2008).

¹¹ ISO 9001 provides a set of standardized requirements for a quality management system, regardless of what the organisation does, its size, or whether it is in the private, or public sector. Organisations can be certified, although certification is not a compulsory requirement of the standard.

Details accessed 17/03/2010 from:

http://www.iso.org/iso/iso_catalogue/management_and_leadership_standards/quality_management/iso_9000_essentials.htm

¹² Levine and Toffell (2010).

Success factors: Possible success factors highlighted consistently across the promising studies include:

- Leadership (and having a clear strategy);
- Resources (financial, personnel and training);
- Organisational culture and structure;
- Staff feelings of active participation (and related employee empowerment and strong teamwork);
- Communication;
- Engagement;
- Prior experience of implementing a quality improvement programme.

A narrative review of different business improvement programmes explored the various critical success factors in TQM/Six-Sigma, JIT/Lean, BPR and ERP (enterprise Resource Planning) programmes.¹³ However, there was no quality appraisal of the included studies, so whilst findings are drawn from a number of studies - which may increase the confidence we can have in them - caution is needed when interpreting these findings. The main finding was that the literature offers general and fairly similar critical success factors across change programmes. **Effective communication, education and training, knowledge transfer, knowledge management (including skills and expertise)** were mentioned as critical success factors in 20 studies, **organisational structure** was mentioned in 19 and **monitoring and evaluation of performance and performance measurements** were noted in 16 studies. Both the Naslund review¹⁴ and these REAs found that few studies discuss what these success factors actually involve, meaning it is difficult to describe what effective communication (for example) looks like in practice.

A meta-analysis examining whether it is more difficult to implement planned organisational change successfully in the public sector than in the private sector found no overall significant differences between the two sectors regarding the amount of change achieved.¹⁵ However, **organising arrangements** (including formal structure, goals, administrative procedures, and reward systems) seem to be more readily changed in the private sector than in the public sector. These

¹³ Naslund (2008).

¹⁴ Naslund (2008).

¹⁵ Robertson and Seneviratne (1995).

organisational characteristics may act as barriers to a public sector change programme. It can also be harder to change **technology and the physical setting subsystems** of public sector organisations than in the private sector. The authors suggest this may partly be due to private managers having greater discretion over the changes. It should not be assumed that a successful private sector change programme would work in the public sector without being tailored. However, this meta-analysis of evaluations does not state whether the evaluative studies all had comparable control groups. So whilst this study offers some of the strongest causal evidence, the role of other factors cannot be ruled out. Across the 47 studies included in the meta-analysis a total of 532 outcome measures were used. Wide variation in outcome measures was also found in this REA and is one of the reasons it is difficult to draw firm conclusions and generalise across studies.

A three-year quasi-experimental manufacturing field study with a non-equivalent control group administered surveys examining the effect of Lean production on work characteristics.¹⁶ The study found negative effects of Lean production were at least partly attributable to declines in perceived work characteristics (**job autonomy, skill utilisation and participation in decision making**). This provides some evidence that implementation of Lean could have some unintended consequences, however since the control and experimental groups were not comparable it is not possible to make a direct causal link between the implementation of Lean and the negative effects reported by employees.

What doesn't seem to work?

None of the papers identified in these REAs offer any clear evidence of what doesn't seem to work in organisational change or business improvement.

As noted above ('what's promising?' section) evidence from one study found that operational practices such as TQM and JIT did not independently impact upon the performance of UK manufacturing companies.¹⁷ However, the quality of implementation of TQM and JIT in these organisations was not measured and findings may not be transferable to organisations outside the manufacturing industry.

¹⁶ Parker (2003).

¹⁷ Birdi et al (2008).

Failure factors: None of the papers identified by this REA offer any clear evidence of what factors act as barriers to organisational change or business improvement.

What's unknown?

Inferences cannot be drawn about the relative merit of various approaches to organisational change. The evidence does not allow, for example, an assessment of the impact of Six-Sigma relative to Lean. Neither is it possible to say for certain whether any specific approach is in itself successful or effective.

Success factors: Due to methodological limitations in the majority of studies identified, whether commonly mentioned factors are actually critical success factors still remains unknown.

The relative importance of different 'critical success factors' to the success of change projects cannot be determined. The evidence does not allow, for example, an assessment of whether 'top management support' makes a programme more likely to succeed. Similarly, an assessment cannot be made of whether 'top management support' is a more or less important 'success factor' than 'effective communication, education and training'. Finally, these factors are of themselves open to various interpretations: what is 'top management support' and what does it entail in a practical sense? Again the literature identified does not enable us to answer this question. Discussing 'critical' success factors in this context is inaccurate; the literature offers at best 'potential' success factors.

The rest of this paper:

The remainder of this paper contains a discussion of the included literature, outlining the different approaches to change together with any *potential* success factors identified. It is important to remember when reading these sections that the REAs found no robust experimental evidence to determine the net effect of any of the different approaches outlined. At best the review uncovered some evidence of what might be considered 'promising/unpromising' approaches. Given the lack of causal evidence the discussion can only go so far as identifying **potential** success factors – some of which are cited repeatedly across the included studies.

4. Approaches to organisational change and business improvement: a discussion of the included literature

These REAs have identified a wide variety of approaches to organisational change and business improvement, ranging from generic approaches such as Six-Sigma, Lean, Kaizen, JIT, TQM and continuous improvement, to specific programmes such as TennCare and EMERGE designed to improve healthcare efficiency in Tennessee and Switzerland respectively.^{18,19} All of these approaches have broadly the same aims (reducing waste/ improving efficiency) and follow a similar structure: identify an issue; collect data and information about it (this might include mapping the processes involved); develop and apply a 'solution'; and then measure/ assess whether the solution has been effective.²⁰

There may be a danger of creating artificial boundaries and distinctions between these different approaches. Naslund's narrative review compared Lean with Just-In-Time and Six-Sigma with TQM finding that the 'new' approaches (Lean, Six-Sigma) are essentially repackaged versions of pre-existing change approaches (TQM, JIT).²¹ Critical success factors identified for each change approach (Six-Sigma, Lean, JIT, TQM) are also compared, and the literature identifies the same factors, such as 'top management support' across all approaches (these factors are discussed further in section 5 of the paper).

From sifting and reviewing the literature, it is also apparent that approaches are often conflated or combined by authors. For example: Birdi et al assessed the impacts of total quality management (TQM) principles on manufacturing productivity, but characterised TQM as including both Kaizen and general continuous improvement (CI) approaches.²² Both Aarke et al and Fischmann assessed the impacts of 'Lean Six-Sigma methodologies', conflating two potentially different approaches.²³ It is not clear where Lean methodologies stop and Six-Sigma methods begin, or whether Kaizen should be considered an

¹⁸ Chang and Troyer (2009).

¹⁹ Schwappach et al (2003).

²⁰ The similarities of these approaches will be discussed in more detail in the general discussion.

²¹ Naslund (2008).

²² Birdi et al (2008).

²³ Aarke et al (2010).

approach in itself,²⁴ or if 'Kaizen events' are part of wider change methodologies.²⁵

Gathering evidence to assess the relative merits of different approaches is therefore difficult and complicated further by the fact that each Six-Sigma or Lean intervention will identify different problems to be addressed in a potentially unique manner. Bearing this caveat in mind, approaches with sufficient case study evidence identified by this review are discussed below.

Kaizen

One pre- and post study examines the impact of a Kaizen improvement effort on improving rapid protein production in biochemical engineering labs.²⁶ In house capacity increased by 11% and reduced time for delivery of purification deliveries by 30% from 11.1 to 7.7 days, however due to the lack of a control group it is not possible to attribute this change to the intervention as other factors may have played a role.

Lean

Four papers examine the application of 'Lean methodology', three from healthcare, and one in construction.^{27,28,29,30} In all four studies, follow-up measures suggest that the intervention had a positive effect on performance, although none of the studies employed controls, so the impact of other factors cannot be ruled out.

Two of the healthcare papers assess the application of Lean methods to hospital pharmacies and drug provision.^{31,32} Both studies described the use of value stream mapping, with one approach also documenting the use of the Lean '5S' tool (sift; sort; sweep; standardise; sustain). In both cases the main Lean intervention was reported to increase the frequency of drug deliveries to wards,

²⁴ Junker (2010).

²⁵ Birdi et al (2008).

²⁶ Junker (2010).

²⁷ L'Hommedieu and Kappeler (2010).

²⁸ Hintzen at al (2009).

²⁹ Fischmann (2010).

³⁰ Freire and Alarcon (2002).

³¹ L'Hommedieu and Kappeler (2010).

³² Hintzen at al (2009).

thus reducing waste and subsequently saving money. One of these studies used an 18 month follow up period and found that a net saving of \$240,000 had been achieved after one year through reducing drug waste by 40% and errors by 83%³². The third healthcare paper describes the impacts of 'Lean Six-Sigma methodologies' (characterised as the 'plan-do-study-act' approach) on improving the timeliness and quality of care and resulted in a reduced time from patient registration to staff check out³³.

Case study evidence of a Lean design process in Chilean construction describes the successful reduction of unit errors in production, process waiting times and non-value adding activities, however the lack of any control sites make any sort of causal statement impossible³⁴. A four-phase improvement process was used (diagnosis and evaluation; changes implementation; control; standardisation) performance indicators were developed and value stream/ process mapping was undertaken. Interventions included improving communication and access to information (intranet site expanded), introduction of checklists, and training.

Six-Sigma

Five separate case studies detail the use of the Six-Sigma DMAIC model (Define, Measure, Analyse, Improve, and Control) in organisational change/ business improvement.^{35,36,37,38,39} Two of the case studies focussed on healthcare; two were based on interventions in manufacturing, and one on library management. Each study reported that the Six-Sigma intervention was effective at increasing efficiency or improving services, however none of the designs were experimental (i.e. employed controls) and so it is impossible to make a direct causal link between the intervention and the reported efficiency improvement.

Healthcare interventions tend to focus on improving the efficiency of procedures, or improving compliance with guidance. Aarke et al describe the use of value stream mapping to identify simple interventions, involving changing **where** patients completed forms, and moving the waiting area nearer to where bone

³³ Fischmann (2010).

³⁴ Freire and Alarcon (2002).

³⁵ Aarke et al (2010).

³⁶ Knowles et al (2004).

³⁷ Kumar et al (2007).

³⁸ Yong Kim et al (2010).

³⁹ Eldridge et al (2006).

densitometry measurement procedures took place. Over the measurement period the total procedure time reduced from 20.95 to 17.95 minutes, however again the lack of a control group means it is not possible to attribute the cause of this improvement to the intervention.⁴⁰ Eldridge et al used the DMAIC method to develop interventions to improve compliance with hand hygiene guidelines. Simple interventions such as increasing ease of access to alcohol gel and introducing more widespread signage are thought to have led to an improvement in observed compliance from 47 to 80 per cent, with the amount of alcohol rub used increasing by more than 70 per cent across all three test sites. Again, the lack of any control sites means that the cause of this improvement cannot be directly attributed to the intervention.

Knowles et al used DMAIC to assess problems in the manufacturing of medicated sweets⁴¹. Three major improvements (removal of air bubbles; adjustment of wrapping machines; variability reduction) cost a total of £13,000 to implement and resulted in estimated total savings of £290,000 after one year. Before these improvements, 1 in 5 sweets had to either be scrapped or reworked. After the intervention, this was reduced to one in 10,000. Kumar et al describe the use of Six-Sigma methods to improve throughput yield and reduce defects in the manufacture of engine parts⁴². Yong Kim et al also describe the use of the DMAIC methodology to improve efficiency in the provision of library services, reporting a reduction of information acquisition times, and improved user satisfaction.

The reported success of the Six-Sigma case studies outlined above suggests that a structured approach to problem solving (e.g. DMAIC), and use of statistical and other analytical tools can be applied in a number of environments. Common across all of these examples is the stringent application of each phase of a structured approach. This suggests that Six-Sigma interventions may be successful when each of the steps of the process is properly addressed.

⁴⁰ Aarke et al (2010).

⁴¹ Knowles et al (2004).

⁴² Kumar et al (2007).

Other approaches

No papers examining specific case studies of Total Quality Management (TQM), Just-In-Time (JIT), or Business Process Reengineering (BPR) interventions were identified in the included literature.

Two bespoke healthcare interventions were assessed through meta analytical approaches. TennCare in Tennessee introduced 'managed care' and saw improved hospital efficiency overall, though impacts differed between urban rural hospitals.⁴³ The EMERGE programme across Switzerland reported reduced time from admission to diagnoses in emergency care as a result of 'hospital specific improvement activities', though these are not detailed.⁴⁴ Neither of these papers explains the steps taken in their improvement programmes.

Some words of warning...

While it is useful to see examples where organisational change and business improvement practices have been applied, it is important to remember that the strength of evidence these case studies offer is largely very weak. The findings are seriously constrained by limitations with regards to validity and the fact that the interventions being discussed are not necessarily transferable to other settings, even potentially in the same area (e.g. healthcare/ manufacturing).

Vest and Gamm undertook a structured review of Six-Sigma and Lean programmes in US healthcare settings (published in 2009).⁴⁵ This review is one of the most methodologically robust papers identified for these REAs. While all case studies reviewed by Vest and Gamm reported positive outcomes, the most important finding from the review was that most studies also had serious limitations that could undermine the validity of their results. The review is highly critical of all the nine Six-Sigma and nine Lean papers it reviews, noting common concerns such as weak study design, inappropriate analysis, and failure to rule out (or consider) alternative explanations for change.

These criticisms equally apply to the papers identified in this REA. The successes described in the above case studies are not necessarily transferable to other

⁴³ Chang and Troyer (2009).

⁴⁴ Schwappach et al (2003).

⁴⁵ Vest and Gamm (2009).

issues (even in the same sector), and in almost all cases the research design means that other potential explanations for success are not considered or controlled for. Furthermore, these interventions have typically been evaluated over a short follow up period, leaving questions about the sustainability of change and longevity of any impact.

5. Potential success factors: a discussion of the included literature

Across the 41 studies included in both reviews a number of factors deemed to be integral to successful change are highlighted. The quality of the evidence base does not allow us to make any strong claims about the potential role of these factors in engineering successful change. Many of the studies examining success factors did not report whether the change programme was successful; used subjective outcome measures (attitudinal surveys of employee perceptions using Likert scales); and did not examine the relative contribution of each of the success factors mentioned. Despite this, the very fact that these factors recur time and again across the case studies may provide some indication that these could be important considerations in enabling successful change. The table below outlines these potential success factors, together with a summary of the evidence and the sort of causal statement the evidence allows.

| Potential Success Factor | Summary of Emerging Evidence | Level of evidence |
|--------------------------|--|---|
| <p>Leadership</p> | <p>Leadership is specifically mentioned as a facilitator in a number of different studies. Little information is given about the <i>specific</i> nature of successful leadership styles however, stability of supervision throughout implementation of change together with direct support from supervisors carrying out 'on-the job' training and staff involvement in decisions were associated with more successful change in one study¹.</p> <p>The issue of staff involvement was picked up in another study which suggested that leaders seem to be viewed as <i>less</i> supportive if employees feel that a change is being imposed upon them from above². The same study suggested that change initiated by employees was positively associated with employee morale. Transformational leadership behaviour³, which includes aspects intended to foster a sense of involvement (employee support and encouragement of <i>group</i> goals), is thought to be associated with reduced employee cynicism⁴.</p> | <p>Consistent – Not causal</p> <p><i>Three reviews conducted with systematic principles but including non-experimental studies^{5,6,7} and seven other studies identified leadership as a possible success factor but their designs do not allow us to make causal statements</i></p> <p>1, 2, 4, 8, 9, 10, 11</p> |

¹ REA 2: Berkhout et al. (2009) – Before and after study.

² REA 2: Griffin et al. (2004) - Longitudinal survey design.

³ Transformational behaviour includes: articulating a vision of future; fostering acceptance of group goals; communicating high performance expectations; providing intellectual stimulation; role modelling and supporting employees.

⁴ REA 2: Bommer et al. (2005) - Longitudinal survey design.

⁵ REA 1: Wardhani et al. (2009) - Literature review conducted with systematic principles.

⁶ REA 1: Boonstra & Broekhuis (2010) – Literature review conducted with systematic principles.

⁷ REA 1: El Shenawy et al. (2007) - Literature review conducted with systematic principles.

⁸ REA 2: Waclawski (2002) - Before and after study.

⁹ REA 2: Grunberg et al. (2008) – Longitudinal survey design.

¹⁰ REA 2: Battilana et al. (2010) – Before and after study.

¹¹ REA 2: Condrey et al. (2005) – Longitudinal survey design.

| Potential Success Factor | Summary of Emerging Evidence | Level of evidence |
|--------------------------|---|--|
| <p>Engagement</p> | <p>The importance of staff feeling actively involved and empowered seems to be a recurring theme. Staff willingness and feelings of active participation in decision making together with having 'room to experiment' and general staff well being are all linked to successful delivery of change¹. One study found that the degree to which staff understood the rationale for the change, felt they had some degree of control over the proposal and felt that their opinions and ideas were being taken into account was positively associated with their acceptance of the change¹².</p> <p>A perceived lack of autonomy may have some serious side effects. A three-year quasi-experiment focussed on the effects of LEAN implementation found that LEAN reduced employees' organisational commitment reduced their 'role based self efficacy' (i.e. confidence to carry out proactive tasks, use their initiative or challenge the status quo) and increased job depression (the psychological strain experienced by employees)¹³. These negative effects were thought to be at least partly attributable to <i>declines</i> in perceived work characteristics (job autonomy, skill utilization and participation in decision making).</p> <p>A further study found that organisational change can have negative impacts on employee well being. In this study successful change was found to increase the job strain (stress) reported by employees¹⁴. Interestingly, role clarity (as opposed to social support) was found to be a more effective in easing this stress.</p> <p>Organisational communication (including perceptions of direct communication with supervisors and degree to which communication is perceived as timely and comprehensive) was found to be the strongest influencing factor on self reports of job performance (including reported</p> | <p>Promising</p> <p>Promising organisational enablers are those where the level of certainty from available evidence is too low to support generalisable conclusions but where there is some empirical basis for predicting that further research could support such conclusions.</p> |
| | | <p><i>A review¹⁵ and four studies^{4, 12, 11, 13} above, identified engagement as a possible success factor, but the designs of these studies do not allow us to make causal statements.</i></p> |

¹² REA 2: Gagne et al. (2000) – Before and after study.

¹³ REA 2: Parker (2003) - Quasi-experimental field study with a non-equivalent control group.

¹⁴ REA 2: Korkuna et al. (2003) – Before and after study with outcomes measured at multiple time points.

¹⁵ REA 2: Naslund (2008) - Review using unspecified search criteria.

| Potential Success Factor | Summary of Emerging Evidence | Level of evidence |
|--|--|---|
| Engagement (continued) | <p>effectiveness, quality, quantity, efficiency and opportunities to be innovative) in one study⁴. This does not necessarily mean that strong communication <i>per se</i> results in improved job performance but rather positive communication and consideration of staff could be symptomatic of a wider organisational culture that values staff and encourages high performance.</p> <p>A review using unspecified sift criteria¹⁵ found that knowledge transfer and knowledge management (including skills and expertise) were mentioned as success factors (alongside effective communication, education and training) in 20 studies of unknown quality.</p> | |
| Resourcing (& sustainability) | <p>Resources: One study found that extra financial and personnel resources were <i>not</i> a determining factor in successful change¹. Conversely lack of resources <i>was</i> identified as a <i>major barrier</i> in a separate study although other barriers were also cited (including turnover, difficulty working across departments and lack of administrative support), making it difficult to isolate resources alone as a determining factor in successful change¹⁶. Rather, evidence suggests that a severe lack of resources can be a barrier but that simply throwing resources at the problem without appropriate leadership, staff participation etc. is not enough to create successful change.</p> | <p><i>Multiple studies but their designs do not allow us to make causal statements.</i></p> |

¹⁶ REA 2: Garrad et al. (2006) - Post-intervention qualitative analysis of a cohort receiving CME training.

¹⁷ REA 2: Meyer et al. (2010) - Before and after study.

¹⁸ REA 2: Rosen et al. (2006) – Before and after study with outcomes measured at multiple time points.

¹⁹ REA 2: Coyle- Shapiro (2002) – Contains two studies, one longitudinal and one before and after.

| Potential Success Factor | Summary of Emerging Evidence | Level of evidence |
|---|--|--|
| <p>Resourcing (& sustainability) (continued)</p> | <p>Sustainability: In ineffective interventions ‘distracting factors’ such as high sickness absence, high staff turnover, feelings of working under pressure and the introduction of multiple simultaneous change projects are all highlighted as potential barriers to change¹.</p> <p>In some cases a high person-organisation ‘fit’ (i.e. congruence between an individuals preferred organisational culture and that they perceive around them) was found to be weakly associated with stronger organisational commitment and intention to stay during/following periods of change¹⁷.</p> <p>One review using unspecified search criteria¹⁵ and two other studies^{18,19} suggested training was a potential success factor. Of these papers, one suggested that training may improve employees’ CI orientation¹⁹. This paper also highlights the importance of a change of thinking in the way that employees construe their work, in particular being more flexible in terms of what they regard as part of their job.</p> | |
| <p>Measuring Outcomes and Benefits</p> | <p>No evidence for this factor was identified in the REAs.</p> <p>However, outside of the REAs, a systematic review found evidence that problem-solving approaches to policing, such as problem-oriented policing, have a positive impact on the problems they target²⁰.</p> | <p><i>No explicit evidence found. A separate systematic review²⁰ found evidence that problem-oriented policing works.</i></p> |

²⁰ Additional review: Weisburd et al. (2008) - Systematic review.

| Potential Success Factor | Summary of Emerging Evidence | Level of evidence |
|---------------------------------|---|------------------------------------|
| Methodology and Rigour | Though implicit in, and fundamental to, all change approaches, these factors were not explicitly addressed by any study. However, one review using unknown sift criteria found monitoring and evaluation of performance and performance measurements was noted as success factors in 16 studies ¹⁵ . | <i>No explicit evidence found.</i> |
| Other contextual factors | <p>One systematic review based on evidence from 26 randomised control trials with control groups suggests that tailoring interventions to address prospectively identified barriers to change can lead to more successful implementation of your change programme²¹. This systematic review identified seven main barriers to consider:</p> <ol style="list-style-type: none"> 1. Administrative constraints (lack of time/ staff/ money)²² 2. Clinical uncertainty (in a policing context this might be working in a fast paced, dynamic and uncertain environment) 3. Patient expectations (in a policing context this might be officer/public expectations) 4. Information management 5. Financial disincentives 6. Negative staff attitudes²³ 7. Anxiety about changing practice²⁴ | Promising |

²¹ REA 1: Baker et al. (2010) - Systematic review.

²² This also links to the resourcing and sustainability success factor.

²³ This also links to the staff engagement success factor.

²⁴ This also links to the staff engagement success factor.

| Potential Success Factor | Summary of Emerging Evidence | Level of evidence |
|--------------------------|--|---|
| | <p>Public/Private sector contextual issues</p> <p><i>Organising arrangements:</i> One meta-analytical study found organising arrangements (including formal structure, goals, administrative procedures, and reward systems) seem to be more readily changed in the private sector than in the public sector²⁵. This suggests some aspects of organisational change may be harder to achieve in the public sector. A review using unspecified sift criteria found <i>organisational structure</i> was mentioned as a success factor in 19 studies of unknown quality¹⁵.</p> <p><i>Technology:</i> One meta-analytical study found it can also be harder to change technology and the physical setting subsystems of public sector organisations than in the private sector²⁵. Despite this, the study found no overall significant differences between the public and private sectors regarding the amount of change achieved.</p> | <p><i>Multiple studies but their designs do not allow us to make causal statements.</i></p> |

²⁵ REA 2: Robertson and Seneviratne (1995) - Meta-analytical study.

Leadership

Leadership is consistently cited as an enabling factor in engineering organisational change, but there is no clear evidence about which leadership style is most effective.

Evidence from a literature review (with systematic principles) which focussed on identifying the determinants of successful quality improvement programmes in healthcare found leadership to be one of the key enabling factors⁷¹. The review specifically highlighted the importance of senior managers *leading by example* to integrate quality improvement into strategic planning and to promote quality values and improvement techniques in work practices throughout the organisation. This finding is supported by evidence from another review (with systematic principles) focussed on the effects of total quality management on competitive advantage which identified top level management commitment and leadership as one of the five key mechanisms for delivering total quality management the others being teamwork, culture, training and process efficiency.⁷²

Leadership is also identified as a key factor in a review (with systematic principles) focussed on understanding the barriers to the acceptance of organisational change in a healthcare setting.⁷³ This review examined the barriers to the introduction of electronic medical records and found that where senior managers supported the introduction of the new system and believed in its benefits, the rate of adoption by physicians improved.

A study of Large Scale Organisational Change (LSOC) in business found that there was a positive relationship between management practices and financial performance.⁷⁴ They found that organisations that achieved LSOC (defined as achieving change in all four specified domains: mission and strategy, leadership, culture and structure) yielded higher financial performance and greater improvement in managerial behaviour than organisations that experienced change in less than four domains or that experienced negative or no change.

⁷¹ Wardhani (2009).

⁷² El Shenawy (2007).

⁷³ Boonstra (2010).

⁷⁴ Waclawski (2002).

Success factors were measured both across and between the least and most successful nursing home wards in a study of healthcare.⁷⁵ Facilitators for change were mostly at the ward level. Findings were mixed regarding leadership style: the least and most successful wards both used participative and socio-emotional leadership styles, however the successful ward allowed staff room to experiment. Since another successful ward used a different leadership style (participative and supportive) no conclusions can be drawn about which style is best and it may be important to tailor the style to the situation.

A longitudinal study of the public sector found that leaders were viewed as less supportive when employees perceived the organisational change to be imposed on them from outside the organisation⁷⁶. A manufacturing study surveyed employees at four points over 10 years during which the company experienced various kinds of organisational change.⁷⁷ The study could not isolate the contributions various factors made to positive changes in employee work attitudes, but suggests that the change in management approach played a part. Differences between leadership styles were also explored by a healthcare study that found leaders who were better at task-oriented behaviours focused more on mobilizing and evaluating activities, whilst those who were better at person-oriented behaviours focused more on communicating activities.⁷⁸ The study did not address which type of activity was more important.

Transformational leader behaviour (TLB) was found to reduce employee cynicism about organisational change in a longitudinal study of manufacturing.⁷⁹ There are six main factors of TLB: articulating a vision of the future, fostering the acceptance of group goals, communicating high performance expectations, providing intellectual stimulation, role modelling, and supporting employees⁸⁰. The authors suggested training and a supportive organisational culture might be needed to promote TLB. Leadership was also mentioned as an important success

⁷⁵ Berkhout et al. (2009).

⁷⁶ Griffin et al. (2004).

⁷⁷ Grunberg et al. (2008).

⁷⁸ Battilana et al. (2010).

⁷⁹ Bommer et al. (2005).

⁸⁰ Podsakoff et al. (1996).

factor in a public sector longitudinal study that examined agency changes in leadership and evolving requirements of new legislation.⁸¹

There is also evidence from reviews that in addition to senior management, leadership at all levels of an organisation can play a key role in successful change.⁸² Project leaders or champions within the organisation can play an important role in implementing change and motivating others to participate, provided they strongly believe that the change will bring benefits and quality improvement, and are willing to bear the risks and costs in order to generate the benefits.⁸³

A number of reasons for the importance of management support at all levels of an organisation are suggested in the reviews. These include the fact that many health care organisations possess a diffuse leadership structure due to the presence of an organised body of professionals who are not direct employees (i.e. consultants). Another suggested reason is that while quality management implementation can take several years to yield significant improvement, senior executive turnover is more rapid and therefore limiting the total responsibility for quality leadership to top management will not guarantee the success of quality management implementation.⁸² The police service also experiences high turnover at senior levels so this could potentially be a reason to explore encouraging the ownership of organisational change throughout the organisation rather than limiting it to senior leaders.

Organisational characteristics

A number of the included studies mention organisational characteristics (resources, culture, and structure) as being important for the success of the change programme.

Resources

Evidence from six studies suggest that resourcing, in terms of organisational systems as well as individual's skills, can be considered as one of the enabling factors contributing to successful organisational change. Berkhout et al. found

⁸¹ Condrey et al. (2005).

⁸² Wardhani (2009).

⁸³ Boonstra (2010).

that extra financial and personnel resources did not play an important role in the change when other factors required for successful change were present.⁸⁴ Conversely, lack of resources was identified as a major barrier to change, in a study of healthcare - though other barriers were also present (lack of administrative support, difficulty collaborating with colleagues from other departments, and clinician turnover).⁸⁵ The potential of resources to act as a barrier was also picked up in a systematic review from a healthcare setting highlighting negative staff attitudes, lack of time, staff and facilities as barriers to change.⁸⁶ Additional review evidence identifies time constraints, lack of money and a lack of technical training and knowledge as barriers to physicians implementing electronic medical records.⁸⁷ A study examining the introduction of 'managed care' to reduce costs of healthcare found a differential impact on hospitals in urban and rural areas.⁸⁸ The authors suggest this may be due to the rural hospitals being small and lacking the financial resources and experience to manage adverse impact compared to their urban counterparts.

Organisational culture

Culture is examined in four studies, three are weak in terms of drawing conclusions about cause and effect, the remaining study is a review following systematic principles. The review cites organisational culture as one of the most important influencing factors in the implementation of quality management. The review found evidence in healthcare that organisational cultures associated with teamwork, assumption of change and risk taking demonstrate a positive correlation with successful quality management implementation whilst hierarchical cultures produce 'precisely the opposite results'.⁸⁹ In the healthcare setting physicians have the dominant power and their subculture can influence the organisational culture and decision making process. In the case of quality improvement that is to be implemented organisation-wide, support from hospital management and all organisational sub cultures, including the physicians, was perceived to be indispensable.

⁸⁴ Berkhout et al. (2009).

⁸⁵ Garrad et al. (2006).

⁸⁶ Baker et al. (2010).

⁸⁷ Boonstra et al. (2010).

⁸⁸ Chang & Troyer (2009).

⁸⁹ Wardhani (2009).

A manufacturing study that emphasised the importance of transformational leader behaviours noted that the culture of an organisation has an important role to play in supporting that success factor.⁹⁰ Culture fit between employees perceived and preferred organisational culture was examined in a private sector study that found that cultural fit could contribute to stronger employee commitment and retention in some circumstances.⁹¹ The importance of culture fit may vary: for employee-centred culture characteristics, in particular, culture strength might be most important whereas for other culture characteristics it may be that fit with employee preferences plays a more important role. Organisations with flexible cultures were found to yield higher financial performance than those with systems that were not so flexible in a business study.⁹²

Organisational structure

Three studies note the role of organisational structure in change. Two of these studies provide review evidence^{93,94} and are discussed in the 'what's promising?' section (above), the other study does not allow us to make causal statements as there was no control group⁹⁵ though it briefly mentions structure as one of the factors that should be considered in order to successfully implement change.

People characteristics

Staff and Training

Two studies, both weak in terms of causal inference, mentioned staff as a success factor. The first noted that the skill and willingness of nurses facilitated change and staff absence, staff turnover and increased work pressure on staff acted as barriers to change.⁹⁶ The authors recommended that education of nursing staff (those implementing the change programme) should be a higher priority than the training of ward management. The second study found that a successful New Public Management programme in the public sector resulted in

⁹⁰ Bommer et al. (2005).

⁹¹ Meyer et al. (2010).

⁹² Waclawski (2002).

⁹³ Naslund (2008).

⁹⁴ Robertson and Seneviratne (1995).

⁹⁵ Waclawski (2002).

⁹⁶ Berkhout et al. (2009).

increased job strain.⁹⁷ Role clarity was found to be more important than social support at work with regard to easing this job strain. The authors suggest that decreased employee well-being may be a barrier for sustained organisational change.

A review⁹⁸ (discussed in the 'what's promising' section) and two studies which were weak in terms of causal inference^{99,100} suggested training as a success factor. A quality improvement initiative involving mandatory training followed by the AIM system (enhanced Ability, Incentives, and Management feedback) was utilized in a healthcare study.¹⁰¹ Responses to nonattendance of training included incentives, warnings and firing. The incidence of pressure ulcers was significantly reduced during the intervention period and training compliance was 100%, but both these effects were lost during the two follow-up periods. It is not possible to assess the importance of training to the final outcome as its effects cannot be isolated from the effects of the other intervention components (incentives, feedback, use of warnings and firings for non-compliance). A manufacturing study found that a TQM training and education intervention (covering leadership styles, empowerment, group management and use of TQM tools and techniques) was associated with a more positive employee CI orientation.¹⁰²

Participation and engagement

Six studies mention participation as a success factor, four of these studies are weak in terms of causal inference, one study is a quasi-experimental study (discussed in the 'what's promising' section)¹⁰³ and the remaining study is a review (following systematic principles).¹⁰⁴

The review focuses on identifying the determinants of successful implementation of quality management in healthcare and highlighted 'physician involvement' as a key factor. Physician involvement is measured as 'clinical emphasis and the

⁹⁷ Korunka et al. (2003).

⁹⁸ Naslund (2008).

⁹⁹ Rosen et al. (2006).

¹⁰⁰ Coyle- Shapiro (2002).

¹⁰¹ Rosen et al. (2006).

¹⁰² Coyle-Shapiro (2002).

¹⁰³ Parker (2003).

¹⁰⁴ Wardhani (2009).

number of active physicians in governance' and is shown to have a significant effect on the successful implementation of quality management. In addition this review also highlights the power conflict between management and physician as a specific barrier to successful implementation of quality improvement.

A separate study (covered in greater detail in the training section) found greater employee participation in the TQM training intervention was associated with a more positive CI orientation.¹⁰⁵ A further study surveyed employees of a telecommunications company before and after organisational transformation and found that encouraging employee participation in decision-making helped them engage in the change process.¹⁰⁶ A public sector study suggests that whilst active participation plays an important role in organisational change, passive participation (e.g. the provision of information) is also an important resource for organisational change.¹⁰⁷ The study also highlighted the importance of checking whether employees feel sufficiently informed and involved. The importance of providing employees with adequate information during organisational change was also mentioned by another public sector study.¹⁰⁸

Communication

Three studies mention communication, one of which is a review¹⁰⁹ (discussed in the 'what's promising' section) and the other two are weak in terms of making causal inferences.

Communication is mentioned in Condrey et al.'s (2005) public sector study as a success factor and the authors emphasize the importance of an organisational climate that is receptive to effective communication.¹¹⁰ The need to communicate and keep employees informed about changes is discussed in another study which found that explaining the need for organisational changes helped decrease employee fears and that trust and adjustment to change could be promoted by engaging with staff concerns.¹¹¹

¹⁰⁵ Coyle-Shapiro (2002).

¹⁰⁶ Gagne et al (2000).

¹⁰⁷ Korunka et al (2003).

¹⁰⁸ Jimmieson et al (2004).

¹⁰⁹ Naslund (2008).

¹¹⁰ Condrey et al (2005).

¹¹¹ Gagne et al (2000).

Other factors

Other potential success factors identified by the studies include: SHRM methods (empowerment; teamwork etc.)¹¹², prior experience of a quality improvement programme¹¹³, and strategy.¹¹⁴ Interestingly, no studies address the importance of analytical capability in their discussion of success factors.

Success factors - some conclusions

- There is no robust evidence of what the critical success factors are for change programmes.
- Potential promising success factors mentioned by the literature are general and common across the various change programmes.
- Possible success factors highlighted consistently across the studies include:
 - Leadership (and having a clear strategy);
 - Resources (financial, personnel and training);
 - Organisational culture and structure;
 - Staff feelings of active participation (and related employee empowerment and strong teamwork);
 - Communication;
 - Prior experience of implementing a quality improvement programme.
- Few studies discuss what these potential success factors actually involve, meaning it is difficult to describe what they look like in practice.

6. General Discussion

Why is the evidence so weak?

The key message of this review is that there has been almost no high quality evaluative or 'what works' evidence on organisational change and business improvement programmes published within the last 20 years. It is not immediately apparent why this should be the case. In terms of conducting social research, it is possible to test the impact of interventions in the environments described. Many of the approaches discussed in the paper advocate the recording of baseline data, and measure of outcomes of interventions against this baseline. Introduction of a comparison group and more rigorous analysis of

¹¹² Birdi et al. (2008).

¹¹³ Mitki et al. (1997).

¹¹⁴ Waclawski (2002).

change are feasible options which have not been explored to date. Potential explanations for the lack of design rigour observed might include:

- 'Results' are required more quickly in the business environment and there may be concerns that more detailed/complex research would slow this process down;
- Change and improvement interventions are instrumental to their aims, i.e. what matters is that money is perceived to have been saved following an intervention, not clarity about the mechanics;
- Financial costs of more detailed research into interventions would reduce the bottom line saving reported by the intervention;
- Change interventions are frequently fronted by external business consultants, who do not stay with organisations long enough to undertake analysis of the sustainability of interventions;
- Consultants arguably have an inherent interest in showing their interventions work, but not in explaining how they work (potential impacts on future business);
- Businesses see themselves as unique case studies to be evaluated in isolation, i.e. they may not see themselves as offering a transferable example to other organisations;
- Competitive advantage: successful businesses do not want to tell their competitors how to achieve the same results.

Despite searching across a 20 year period (back to 1991) and on issues which are essentially the preserve of business, the most frequent area addressed in the included papers was healthcare and two thirds of these healthcare papers were published in the past three years. Improvement approaches (particularly Six-Sigma) may have seen more recent and widespread use in healthcare. Healthcare in general takes an evidence-based approach, with knock-on implications for evaluation of interventions, which may explain the relatively large number of papers from this area. Healthcare is also an area where (in the UK) there is less pressure to generate profit through competitive advantage, and where sharing good practice is encouraged and supported. However, the volume of papers in other fields may have been more highly concentrated pre 1991.

So what can be drawn from this review?

Although there is no clear evidence to support any particular approach, or the central importance of a particular set of factors, there is equally no evidence that any of the interventions or factors have a definitively negative effect. The key message therefore seems to be the broad similarity of the various approaches to organisational change and business improvement identified in this review. This point is best illustrated by Naslund's review of 'critical success factors' identified across the literature on Six-Sigma, Lean, TQM and JIT which suggests similar factors are important in ensuring the success of each of these approaches.¹¹⁵

This finding is perhaps not too surprising when the overall improvement methodology of the approaches and their common roots are considered. Table 1 outlines the basic improvement methodology of the main approaches identified in the review (Six-Sigma, Lean, and Kaizen), as well as the processes advocated in QUEST/ CI, problem-oriented policing (problem solving) and the national intelligence model. The table illustrates that at their most basic level, all of these approaches follow broadly similar methods in looking for improvements or solutions to problems. The PDSA (plan; do; study; act – formerly PDCA: plan; do; check; act)¹¹⁶ structure originally advocated by W. Edwards Deming¹¹⁷ (hence also known as a 'Deming cycle') is found at the root of Six-Sigma, Lean and Kaizen approaches. Like the SARA (Scan, Analyse, Respond, Assess) approach to problem-solving in policing, it is a cyclical approach intended to refine interventions/ systems and look for further improvements. The similarities are likely to stem from common origins in what is often described as the scientific method or the research process: develop theory, articulate hypotheses, collect data to test hypotheses, analyse data, return to theory.¹¹⁸

'Statistical process control'¹¹⁹ involving the measurement and assessment of variance in systems is central to Deming's philosophy. He was awarded the US National Medal of Technology and Innovation: 'for his forceful promotion of

¹¹⁵ Naslund (2008).

¹¹⁶ Boaden et al (2008).

¹¹⁷ Boaden et al (2008).

¹¹⁸ See Sherman (1998); Federal Judicial Center, (2000); Scott, (2000); Field, (2009).

¹¹⁹ Statistical Process Control distinguishes between natural variation and variation that can be controlled. Processes which are in 'statistical control' are those which only have natural variation (Boaden et al., 2008). A key feature of Statistical Process Control is 'the management of a quality acquired scientific and statistical foundation' (Kolesar, 1993).

statistical methodology, for his contributions to sampling theory, and for his advocacy to corporations and nations of a general management philosophy that has resulted in improved product quality'.¹²⁰ Given Deming's legacy, analytical and statistical methods are therefore perhaps the most fundamental premise of all the approaches to OC/BI identified in the REAs. Analysis and statistics are not identified as standalone critical success factors perhaps because they are inherent to a Deming inspired approach: organisational improvement cannot take place without them. Further examination of Deming's own publications may be valuable in identifying potential success factors and tools for analysis of organisational change.

While there are important differences in the original purpose, emphasis and ideas behind the approaches in Table 1, it is the case that they all broadly follow an iterative approach based on: identifying a problem; assessing how to resolve the problem; acting on your assessment, and; evaluating the impact of your solution. While different tools and approaches may be used in assessing the problem and collecting evidence, the overall approach is similar. Seen in this light, organisational change and business improvement in policing can be viewed as essentially an extension of problem-solving approaches that are already used into different areas and processes. As well as using a problem-solving approach to resolve antisocial behaviour, the service could apply the same methodology to a core process such as custody management – asking where problems or inefficiencies exist, collecting and analysing relevant data, intervening to address identified issues, and measuring the impact of this intervention.

Only a limited number of papers were included in the REAs as the vast majority of change literature fails to measure or assess the impacts of interventions in a clear and transparent way. Successful and transferable improvement programmes should be underpinned by strong analysis and evaluation so their impact can be clearly demonstrated.

¹²⁰ <http://www.uspto.gov/about/nmti/recipients/1987.jsp>

Table 1: Selected OC/BI approaches and their overarching methods.

| Approach | Phases | | | |
|--|--|----------------------------------|------------------------------|---------------------|
| | 1 | 2 | 3 | 4 |
| Deming Cycle | Plan | Do | Study | Act |
| Six-Sigma | Define | Measure | Analyse | Improve/ Control |
| Lean | Sift/sort | Sweep | Standardise | Sustain |
| Kaizen | Plan | Do | Study | Act |
| QUEST/ CI | Identify issues | Solution design | Measuring outcomes | Presenting benefits |
| National Intelligence Model¹²¹ | Assets/Info Sources/ Info & Intel. Recording | R & D /Analysis/ Intel. Products | Strategic & Tactical Tasking | Operational Review |
| Problem solving | Scan | Analyse | Respond | Assess |

7. Conclusions

From the existing evidence, it is not possible to say ‘what works’ in organisational change or business improvement. Similarly, no specific factors can be said to be essential to successful change. Most approaches to change follow a similar structure based on the PDSA cycle (plan-do-study-act). The DMAIC approach of Six-Sigma and the SARA approach of problem solving both follow a broadly similar approach in terms of structure. Successful case studies identified by the REAs have one very important thing in common - they actually follow each step of the procedure. Ignoring the final assessment/ evaluation phase of interventions means it is not possible to test empirically the value of an intervention and show whether it was successful. The SARA approach in problem solving is frequently criticised for being applied in practice as SAR- ignoring the final assessment phase.¹²²

In other words, no magic pill or panacea will deliver successful organisational improvement. Whichever approach organisations choose or undertake, capacity is critical for every step of the process, especially analytical capacity to identify

¹²¹ Adapted from <http://www.npia.police.uk/en/9015.htm> accessed 15/03/11

¹²² Weisburd et al. (2008).

baseline measures and thereafter measure success. Organisations can only check the sustainability of an intervention if baseline data are collected and the impact of the project is evaluated. Follow up measures of baseline data after the project is complete can indicate whether other improvements are required, and if initial changes have become fully embedded. Building general analytical capacity and the ability to use specific tools (e.g. value stream mapping) would help prepare the service for large scale change more effectively.

8. Implications for practice

Making recommendations for practice based on the existing evidence would be risky as the evidence is not of sufficient quality to attribute causality to specific factors or change programmes. However, the evidence does indicate that change programmes may be more successful when:

- Staff are actively engaged in the change process: they feel change is something done with them, not done to them;
- Potential obstacles to change are identified, and mitigated for, before the changes are made;
- Staff are supported by a consistent leadership team throughout the change process;
- Sufficient resources are available to those managing the change project to ensure delivery.

Practitioners may want to consider:

- How to ensure early, and continued consultation with business areas likely to be impacted by the business change programmes;
- Talking to staff on the front line about any barriers they see to proposed changes, and how to demonstrate that these issues have been responded to through adaptation of the programme plans or the provision of other support;
- How to ensure a consistent and supportive management structure is in place for the duration of the change programme;
- How to ensure the change programme clearly identifies its resource requirements and is provided with the necessary time/ money/ people to achieve its aims.

Above all:

Whichever approach to change is adopted, it necessary to ensure each step of the approach is followed and the benefits are properly assessed.

References:

Included studies:

Aakre, K.T., Valley, T.B, O'Connor, MK (2010). *Improving patient flow for a bone densitometry practice: results from a Mayo Clinic Radiology Quality Initiative*. RadioGraphics 30: 309-315.

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Annex A: Details of the searching and sifting criteria

Search terms

For the first REA systematic searches were carried out to identify systematic reviews examining organisational change across all sectors. For the second REA systematic searches were carried out to identify evaluative studies (with a minimum of a pre-post measurement in a single site) that addressed the following questions:

1. Search 1: What are the critical success factors in delivering organisational change?
2. Search 2: What are the critical success factors in delivering business improvement?
3. Search 3: What evidence exists on the impact of different approaches to business improvement?

Relevant databases held by the National Police Library were searched along with internet databases for both REAs. There were no date limits on the search for REA 1, but for REA 2 time constraints and the volume of abstracts identified from pilot searches led to the searches being restricted as follows: only title/abstract was searched; dates for inclusion were limited to 1991-2011; only English language papers were included; only articles from journals or peer reviewed journals with full available abstracts were included. The search criteria are set out below.

REA 1 - A review of reviews on 'what works?' in organisational change

change AND organisation* OR continuous improvement
 AND evaluat* OR assess* OR 'what works' OR impact OR success*
 AND systematic review OR meta analysis

REA 2 – What works in organisational change and business improvement?

| | |
|----------|--|
| Search 1 | "organisational change" OR "organizational change" AND evaluat* OR assess* OR what works OR impact OR success* OR sustain* OR effect* |
| Search 2 | "business improvement" OR "business efficiency" OR "organi*ation* improvement" OR "organi*ation* efficien*" AND evaluat* OR assess* OR what works OR impact OR success* OR sustain* OR effect* |
| Search 3 | "Lean process" OR "Lean method" OR Lean program*" OR Lean technique*" OR "Lean production" OR "continuous improvement" OR "system* thinking" OR "Kaizen" OR "Six-Sigma" AND evaluat* OR assess* OR what works OR impact OR success* OR sustain* OR effect* |

Search results

Table 1: Search results for REA 1 - A review of reviews on 'what works?' in organisational change

| Database/website | Total number of papers identified | Included after first sift | Included after full paper examined |
|---------------------------------|-----------------------------------|---------------------------|------------------------------------|
| Database searches | | | |
| Emerald | 10 | 1 | 1 |
| Web of Science | 301 | 5 | 1 |
| Medline | 120 | 3 | 1 |
| EBSCO | 10 | 1 | 0 |
| CSA | 27 | 2 | 1 |
| Sub-total | 468 | 12 | 4 |
| Online searches | | | |
| Institute of Employment Studies | 6 | 0 | 0 |
| Institute of Work Psychology | 14 | 0 | 0 |
| Work Foundation | 15 | 0 | 0 |
| Campbell Library | 168 | 0 | 0 |
| Cochrane Library | 123 | 1 | 1 |
| EPPI Centre | 0 | 0 | 0 |
| CIPD* | 3 | 0 | 0 |
| Sub-total | 329 | 1 | 1 |
| TOTAL | 797 | 13 | 5 |

* Chartered Institute of Professional Development

Table 2: Search results for REA 2 - What works in organisational change and business improvement? (All three searches)

| Database/website | Total number of papers identified | Included after first sift | Papers received by cut off date | Papers included after full paper examined |
|--------------------------|-----------------------------------|---------------------------|---------------------------------|---|
| Database searches | | | | |
| CSA | 1,984 | 19 | 10 | 6 |
| EBSCO | 1,732 | 30 | 20 | 3 |
| Emerald | 2,432 | 27 | 24 | 4 |
| Medline | 1,159 | 32 | 23 | 10 |
| Web of Science | 3,846 | 70 | 57 | 13 |

| | | | | |
|---------------------------------|---------------|------------|------------|-----------|
| Sub-total | 11,155 | 178 | 134 | 36 |
| Online searches | | | | |
| Campbell Library | 0 | 0 | - | 0 |
| CIPD* | 0 | 0 | - | 0 |
| Cochrane Library | 2 | 0 | - | 0 |
| EPPI Centre | 0 | 0 | - | 0 |
| Institute of Employment Studies | 4 | 0 | - | 0 |
| Institute of Work Psychology | 2 | 0 | - | 0 |
| Work Foundation | 0 | 0 | - | 0 |
| Sub-total | 8 | 0 | - | 0 |
| TOTAL | 11,163 | 178 | 134 | 36 |

* Chartered Institute of Professional Development

Sifting

REA 1:

Duplicates were removed and remaining abstracts were sifted for relevance using the criteria set out below. From 797 references initially identified by the searching, only 5 papers were included in the final review. Due to time constraints papers which were not available electronically through the National Police Library were not included and this resulted in 5 studies not being included in the review.

REA 2:

Across all three searches a total of 11,155 potentially relevant papers were identified and sifted for relevance using the criteria set out for each search below (tables 4, 5, and 6). After the removal of duplicates, a total of 178 papers were called. Due to the limited time available to conduct this REA, only papers available electronically through the National Police Library or received from the British Library by the 4th March 2011 were included. By our cut off date, 134 of the 178 papers had been received. After examining these 134 full papers, a total of 36 papers met the inclusion criteria specified below (tables 3, 4 and 5).

Sift criteria for review of reviews on ‘what works?’ in organisational change (REA 1)

The aim of sifting is to identify systematic reviews or meta-analyses of organisational change, change programmes, or continuous improvement programmes. We are interested in papers from a variety of areas, not just policing.

Table 3:

| | Question | Answer | Action |
|--|---|----------------|---------------|
| Q1 | Is the paper a systematic review? | No | Exclude |
| | | | |
| | | Yes | Go to Q2 |
| | | | |
| | Unclear | Cannot exclude | |
| | | | |
| Q2 | Is the paper about: <ul style="list-style-type: none"> • Organisational change; or • Change programmes; or • Continuous improvement programmes | No | Exclude |
| | | | |
| | | Yes | Include |
| | | | |
| | Unclear | Exclude | |
| | | | |
| If paper is included then tag whether: | | | |
| Organisational change; change programme; or continuous improvement programme | | | |

Notes: Exclude protocols for systematic review; Exclude theoretical papers and literature reviews

Sift criteria for what works in organisational change and business improvement? (Search 1: REA 2)

The aim of sifting is to identify evaluations of organisational change, change programmes, or continuous improvement programmes. Whilst this sift is not specifically looking for systematic reviews, any that are found should be kept in as they may be relevant to another REA we are conducting.

Table 4

| | Question | Answer | Action |
|---|---|---------------|---------------|
| Q1 | Is the paper about: <ul style="list-style-type: none"> • Organisational change; or • Change programmes; or • Continuous improvement programmes | No | Exclude |
| | | | |
| | | Yes | Go to Q2 |
| | | | |
| | | Unclear | Exclude |
| | | | |
| Q2 | Is the paper a systematic review or an evaluation to level 2 or above on the Maryland Scale (pre and post measurement) | No | Exclude |
| | | | |
| | | Yes | Include |
| | | | |
| | | Unclear | Exclude |
| | | | |
| If paper is included then tag: | | | |
| (1) Methods: Is the paper (a) level 3 plus (quasi experiment, randomised control trial, systematic review) OR (b) level 2 (before and after study, without control group). | | | |
| (2) Topic: Organisational change OR Continuous Improvement | | | |
| (3) Area: e.g. business, policing, healthcare, etc. | | | |

Notes: Exclude theoretical papers and literature reviews; Exclude protocols for systematic reviews

Sift criteria for What works in organisational change and business improvement? (search 2:REA 2)

The aim of sifting is to identify papers looking at business or organisational improvement/ efficiency interventions. Papers should evaluate or assess the impact/ success or the sustainability of the intervention. We are interested in papers from a variety of areas, not just policing.

Table 5:

| | Question | Answer | Action |
|---|---|---------------|---------------|
| Q1 | Is the paper about a: <ul style="list-style-type: none"> • (a) business or organisational • (b) improvement or efficiency procedure/ programme/ intervention? | No | Exclude |
| | | | |
| | | Yes | Go to Q2 |
| | | | |
| | | Unclear | Exclude |
| | | | |
| Q2 | Is the paper a systematic review or an evaluation to level 2 or above on the Maryland Scale (pre and post measurement) | No | Exclude |
| | | | |
| | | Yes | Include |
| | | | |
| | | Unclear | Exclude |
| | | | |
| If paper is included then tag: | | | |
| (1) Methods: Is the paper (a) level 3 plus (quasi experiment, randomised control trial, systematic review) OR (b) level 2 (before and after study, without control group). (2) Area: e.g. business, policing, healthcare, etc. | | | |

Notes: Exclude theoretical papers and literature reviews – assessment/ evaluation of the programmes are of interest. Exclude protocols for systematic reviews

Sift criteria for what works in organisational change and business improvement? (Search 3: REA 2)

Search for the following in title and abstract only:

Lean OR continuous improvement OR system* thinking OR Kaizen OR quality management OR Six-Sigma
 AND evaluat* OR assess* OR what works OR impact OR success* OR sustain* OR effect*

NOTE: The above approaches to organisational change were included after an initial sift of the literature in this field. Although, Business Process Re-engineering (BPR) was not used as a specific search term, a number of abstracts of papers discussing BPR were identified from this search and were sifted in.

Table 6:

| | Question | Answer | Action |
|--|--|---------|----------------|
| Q1 | Is the paper about: <ul style="list-style-type: none"> • Continuous improvement; or • Quality management; or • Kaizen; or • The “Lean” method; or • The “Systems thinking” method or • Six-Sigma | No | Exclude |
| | | | |
| | | Yes | Go to Q2 |
| | | | |
| | | Unclear | Cannot Exclude |
| Q2 | Is the paper a systematic review or an evaluation to level 2 or above on the Maryland Scale (pre and post measurement) | No | Exclude |
| | | | |
| | | Yes | Include |
| | | | |
| | | Unclear | Exclude |
| If paper is included then tag: | | | |
| (1) Methods: Is the paper (a) level 3 plus (quasi experiment, randomised control trial, systematic review) OR (b) level 2 (before and after study, without control group). 1. Area: Kaizen OR Quality management OR Continuous improvement OR Lean OR Systems thinking. | | | |

Notes: Exclude theoretical papers and literature reviews. Exclude protocols for systematic review

Critical appraisal

Studies were critically appraised in three key ways:

1. Assessing the level (quality) of evidence using the Maryland Scale
2. Assessing the overall transparency of studies in terms of the methods used
3. Assessing the overall validity of the methods used in terms of the quality, consistency and relevance of selected outcome measures

The Maryland Scale of Scientific Methods (MSSM) ¹ was used to assess the overall level of the evidence, and most importantly whether any causal relationship between claimed benefits and the OC/BI programme could be inferred from each study. A limited number of studies enabled us to establish a causal link, which meant that the REAs have had to incorporate evidence from papers with other study designs. Some types of research design (particularly qualitative studies) do not fit neatly into the Maryland Scale classification, and subsequently further critical appraisal of these studies is required.

Studies were also assessed in terms of how transparent they were in describing their methods. Some studies were weak in terms of their transparency, for example, in using different people to respond to the baseline and post-change survey and one study used different methods to administer the baseline and comparison survey. Some studies were vague about the organisational change itself, what it involved and whether it was a success or not.

Studies were also examined in terms of their validity for making judgements about OC/BI programmes. The reliability and generalisability of outcome measures were considered. For example, many studies used perception and self-reported data rather than specific empirical measures to assess the impact of programmes. Broadly speaking our confidence in studies based on self reported or perception data findings (and the weight we give their conclusions) is more limited than for studies with a clear empirical basis. Critically, some studies were unclear about whether benefits claimed as a result of interventions were projected or had actually been achieved, flagging concerns about their overall validity and reliability.

Annex B: The Maryland Scale: a model for assessing the level of evidence ¹²³

Each design is described below - Level 1 is the weakest evaluation design while Level 5 is seen as the 'gold standard'. In all cases the validity of statistical conclusions must be checked and measurements must be verified as valid and reliable.

Why does the level matter?

After each design, an example is given of what conclusion could be drawn from an improvement in the desired outcome. An example of how a positive finding might be phrased is shown underneath. Below level 3, it is easy to argue that other possible explanations for any improvement cannot be ruled out, as can be seen from the weaker language in the statements.

1. Correlation between an intervention and a measure at one point in time.

'Officers in forces with access to mobile information may spend more time on the street than the national average, although there may be other reasons for the difference.'
Officers spent more than 60% of their time out of station in a force/BCU which had introduced mobile information systems, compared to a national average of 50%.

2. Measures before and after the programme, with no comparable control condition.

'Taken together with information about implementation of the pilot and other activities in the force over the same time period, this result suggests that the increase could be attributed to the introduction of the systems, although the influence of other factors cannot be ruled out.'

The amount of time spent by officers out of station in the force/BCU increased from 40% to 60%, six months after mobile information systems were introduced.

3. Measures before and after in experimental and comparable control conditions.

'Taken together with information about processes in the two sites, the evidence suggests that the positive changes in the pilot sites are likely to be attributable to the introduction of mobile information, rather than other factors.'

The amount of time spent by officers out of station in the pilot force increased from 40% to 60%, while it increased from 45% to 47% in Y force where mobile data was not introduced.

¹²³ The Scientific Methods Scale, adapted from Farrington, D et al, Chapter 2, in Sherman, L et al (eds), 2002, Evidence-based Crime Prevention.

4. Measures before and after in multiple experimental and control units, controlling for other variables that influence the desired outcome.

'Overall the evidence is consistent that the introduction of mobile information led to a positive effect across the programme on the time officers spent on the street.'

The amount of time spent by officers out of station in the ten pilot forces increased from an average of 45% to 55%, while it increased from 42% to 47% in the comparison sites where mobile data was not introduced.

5. Randomised Controlled Trial: random assignment of programme and control conditions to units. Provides the strongest example of a counterfactual (what would have happened without the programme).

'The evidence suggests that the programme had a positive impact on the amount of time officers spent on the street.'

The amount of time spent by officers out of station across the ten pilot forces increased from 45% to 55%, and from 42% to 47% in control sites without mobile information.

Summaries of the evidence to find out 'what works'

When evidence is summarised systematically (now standard in social research), to allow an assessment of 'what works' to address a particular policy or practice issues, only studies at level 3 and above with statistically significant results are likely to be included, as in the following example also taken from Sherman et al (2002).

What works (Good practice)

Programmes that have desired impact in the kinds of social contexts in which they have been evaluated. Must have at least two level 3-5 evaluations with statistically significant and desirable results and the preponderance of all available evidence showing effectiveness.

What doesn't work (Bad practice)

Programmes that fail to have desired impact. Must have at least two level 3-5 evaluations with statistical significance tests showing ineffectiveness and the preponderance of all available evidence supporting the same conclusion

What's promising (Promising/noteworthy practice)

These are programmes where the level of certainty from available evidence is too low to support generalisable conclusions, but where there is some empirical basis for predicting that further research could support such conclusions. Programmes are coded as promising.

What's unknown

Any programme not classified in one of the above three categories is defined as having unknown effects.

Annex C: Table of included studies

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
|--|------------------|--|--|---|
| <p>Aakre et al. 2010</p> <p>Healthcare</p> | <p>Six Sigma</p> | <p>- Case study of the implementation of the Six Sigma DMAIC model (Define, Measure, Analyse, Improve, and Control).</p> | <ul style="list-style-type: none"> - Process changes led to a reduction in the average time required for a bone densitometry study from 20.95 to 17.95 minutes. - This change represented a 15% reduction in the initial patient cycle time with no change in staff or costs. - Very minor changes: form filling done before going into the exam room: secondary waiting area closer to the exam room so patients were not 'picked up' by technologists. - Result: 6 more patients could be seen per day as a result of changes. | <p>Causality cannot be inferred.</p> |

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
|--|---|--|---|---|
| Baker et al 2010 Healthcare | Examined barriers to change programmes | - Cochrane systematic review providing evidence from 26 Randomised Controlled Trials with control groups. | <ul style="list-style-type: none"> - Findings suggest that tailoring interventions to address identified barriers to change can lead to more successful implementation of your change programme. - Identifies barriers to organisation change, including: <ol style="list-style-type: none"> 1. Administrative constraints (lack of time/ staff/ money) 2. Clinical uncertainty 3. Patient expectations 4. Information management 5. Financial disincentives 6. Negative staff attitudes 7. Anxiety about changing practice | The systematic review suggests causal links. |
| Battilana et al. 2010 Healthcare | Model emphasises implementation, communicating and evaluating | <ul style="list-style-type: none"> - Data were gathered from 89 change projects implemented by 89 managers in 77 different organisations between January 2003 and December 2004. - Participants filled out a 360 degree leadership survey three months before attending a two week strategic leadership executive program and three and a half months before project implementation. - After 12 months of project implementation a telephone survey was administered to examine how managers had implemented their change projects. | <ul style="list-style-type: none"> - Study provides evidence of the role of different leadership competencies in different activities involved in planned organisational change implementation. - Leadership competencies might differentially influence emphasis on the three key activities in organisational change, suggesting that when dealing with the role of leadership in change implementation, change should be considered as a complex multi-dimensional task composed of different activities. | Causality cannot be inferred. |

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
|---|------------------------------|--|---|--|
| Berkhout et al. 2009 Healthcare | Resident oriented care model | <ul style="list-style-type: none"> - Before and after study, forming part of a wider study. - Quantitative questionnaires measured extent to which the four characteristics of resident-oriented care were implemented. The success conditions for change were measured through nine qualitative interviews. | <ul style="list-style-type: none"> - Facilitators for the change were largely at the ward level: strategy, systems, the skill and willingness of the nurses. - Education of the nursing staff should receive more attention than training for ward management. - Barriers included staff absence, increased work pressure and staff turnover. | Causality cannot be inferred. |
| Birdi et al. 2008 Manufacturing | TQM, Lean, SHRM and JIT | <ul style="list-style-type: none"> - Longitudinal study based on three sets of survey responses and empirical data on productivity derived from returns to at Companies House. - Multiple measures of performance before and after the introduction of the practices. - Covers large number of companies (308) over long period (22 years). | <ul style="list-style-type: none"> - Measures impact of seven management practices on productivity. - Finds performance benefits from empowerment and extensive training, with teamwork enhancing the effects of both. - None of TQM, JIT or advanced manufacturing technology has a statistically significant effect on productivity. - Teamwork positively moderates the impact of all other practices. | Pre-post design with quantifiable measurements suggests causality, however the influence of other factors cannot be ruled out since there is no control group. |

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
|--|-----------------------------|--|--|---|
| Bommer et al. 2005 Manufacturing | External change (growth) | <ul style="list-style-type: none"> - Longitudinal data collected in 2 waves 9 months apart from 561 employees in three manufacturing firms. - Assessed individual level change - Used Likert scales | <ul style="list-style-type: none"> - Transformational leader behaviours (TLB) generally were associated with lower employee cynicism about organisational change. - Change implementers who engage in TLB can effectively reduce their subordinates' cynicism about organisational change which has been shown in other studies to be detrimental to the effective functioning of organisations. | Causality cannot be inferred. |

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
|---|---|--|---|---|
| Boonstra & Broekhuis 2010 Healthcare | Change programme consisting of the introduction of electronic medical records | Literature review with systematic principles containing 22 studies (13 quantitative, 7 qualitative, 1 concept mapping, 1 mixed methods). | Promising/ Unknown: - - Findings suggest that the eight categories of barrier are interrelated and the organisational and change process barriers mediated the other six categories of barrier. *Starred barriers are those most frequently identified as issues amongst the 22 studies. - Identifies eight categories of barriers to the implementation of electronic medical records in healthcare: 1. Finance* 2. Technical* 3. Time* 4. Psychological 5. Social 6. Legal 7. Organisational 8. Change process | Causality cannot be inferred as there was no quality appraisal of the included studies. Consequently, the influence of other factors cannot be ruled out. |

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
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| Carr 2002 Healthcare | Six Sigma, Lean | - Pre and post measures. | <ul style="list-style-type: none"> - Four months after the introduction of the PDSA model, the number of patients refusing analgesics had significantly decreased. - Does not discuss success factors in detail, but notes that a central part of the project was ensuring staff felt part of the changes. Staff were motivated to participate, suggest improvements and evaluate their effectiveness. | Causality cannot be inferred. |
| Chang & Troyer 2009 Healthcare | TennCare | - Statistical analysis based on secondary data from hospital Annual Reports, PPS payment impact data, and area resource files. | <ul style="list-style-type: none"> - Modest overall gain in hospital efficiency between 1990 and 2001. - Differential impact of reforms on hospitals in urban and rural areas - Efficiency gains in urban areas, while changes often resulted in efficiency losses in rural hospitals. | Causality cannot be inferred. |
| Condrey et al. 2005 Public sector | Changes in leadership and new legislation | - Longitudinal survey, administered in 1999 and then 2000, based on staff perceptions. | - Suggests the following success factors: trusted leadership, and an organisational climate that is receptive to and fosters effective communication. | Causality cannot be inferred. |
| Coyle-Shapiro 2002 Manufacturing | TQM | - Examined the effect of 2 change interventions on employee attitudes. (1) Employees were surveyed at two time points (9 months and 32 months after the start of the TQM intervention, (N=118)); (2) 10 months prior to and 20 months subsequent to the introduction of a profit sharing program (n=141)). | <ul style="list-style-type: none"> - Participation in a TQM intervention can enhance the development of employee orientation to continuous improvement. - Potential success factors included: training and education on the change programme and employee participation in the change. | Causality cannot be inferred. |

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
|---|---------------|---|--|--|
| Eldridge et al. 2006 Healthcare | Six Sigma | - Measurement via observed compliance with hand hygiene practices; mass of alcohol-based hand rub used per 100 patient days; attitudinal survey. | <ul style="list-style-type: none"> - Interventions to improve compliance with CDCP hand hygiene guidelines. - Observed compliance increased from 47 to 80 per cent (4,000 observations). - Mass of alcohol rub used increased by 97, 94 and 70 per cent in each of the 3 ICUs – increases sustained for 9 months. | Pre-post design with quantifiable measurements suggests causality, however the influence of other factors cannot be ruled out since there is no control group. |
| El Shenawy et al 2007 Business | TQM | - Literature review to establish a theoretical model of total quality management (TQM) plus a meta analysis of qualitative studies to test this framework. Methods in translating the meta analysis to findings have limitations. | <ul style="list-style-type: none"> - Findings suggest that all of the components identified in the literature review are important in delivering a competitive advantage to a business. - Identifies (from a literature review) a theoretical model of total quality management (TQM) based around five key components: <ol style="list-style-type: none"> 1. Top management commitment 2. Use of teams 3. A supportive organisational culture 4. Training and education 5. Process efficiency | Causality cannot be inferred because the included studies were not experimental and were not quality appraised. |

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
|---|------------------------|---|---|---|
| Fischman 2010 Healthcare | Continuous Improvement | <ul style="list-style-type: none"> - Baseline data was collected over 14 consecutive clinic sessions in November 2008. Follow up data were collected for Monday afternoon clinic sessions from February 2nd to 23rd for 2009. - There were 47 patients in each of the intervention and control groups. | <ul style="list-style-type: none"> - Encounter lengths were shorter in the intervention group than the control group and intervention patients waited for significantly less time between triage and seeing a physician. | Causality cannot be inferred. |
| Freire & Alarcon 2002 Construction | Lean | <ul style="list-style-type: none"> - Pre and post measures related to productivity. | <ul style="list-style-type: none"> - Six months after the introduction of Lean product unit errors, waiting time in process and the proportion of non-value adding activities were all reduced, thus increasing productivity. | Causality cannot be inferred. |
| Gagne et al. 2000 Business | No details | <ul style="list-style-type: none"> - Employees from 2 departments of a telecommunications company that was undergoing profound organisational transformation completed a questionnaire at Time 1 (N=159) (just before organisational changes were instituted) and 13months later at Time 2 (N=99) (during the transition period). - High attrition (60%). Authors state this was a result of various factors including turnover which was quite high because transformation involved some downsizing. | <ul style="list-style-type: none"> - Authors state that keeping employees informed about upcoming changes and explaining the need for the changes can help people to decrease employees' fears. - Acknowledging employees' feelings and listening to their fears can facilitate trust and adjustment. - Offering some choice about how to implement the changes through employee participation can engage employees in the change process. | Causality cannot be inferred. |

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
|---|---|---|--|---|
| Garrad et al. 2006 Healthcare | Continual Medical Education Programme | <ul style="list-style-type: none"> - Cohort design used with qualitative analysis presented in a case study format. - Quantitative measures assessed changes in knowledge and treatment confidence, and site-specific organisational changes were qualitatively evaluated. - A needs assessment conducted 6 weeks before phase 2 provided baseline information on education and administrative and policy problems, resources, and clinical settings. - Intervention was an 8-month training program with 3 phases: 6 week needs assessment, 2 day CME program, and a 6 month follow up period. | <ul style="list-style-type: none"> - Knowledge significantly increased following the CME program. - In 93% of the sites there were organisational changes such as HCV support group-initiated group education, protocol changes, development of business plans etc. - Major barriers to change included: lack of administrative support or resources (or both), difficulty collaborating with mental health colleagues, lack of administrative buy-in, and clinician turnover. - Authors note that if positive change was not present by the third month then it was unlikely to develop by the sixth month. | Causality cannot be inferred. |
| Griffin et al. 2004 Public sector | Examined sources of organisational change | <ul style="list-style-type: none"> - Longitudinal study which administered two surveys to employees in 162 workgroups matched across the two time points to explore whether organisational change had different effects on perceptions of group leadership and morale depending on its origin. - Findings are based on perception data. | <ul style="list-style-type: none"> - Leaders seen as less supportive when employees perceived the change to be imposed from outside the work group. In contrast, when the group leader initiated the change they were viewed as more supportive and effective. - Presenting changes initiated at a higher organisational level as their own may help leaders to be perceived as supportive. | Causality cannot be inferred. |

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
|--|-----------------|--|--|---|
| Grunberg et al. 2008 Manufacturing | External change | <ul style="list-style-type: none"> - 525 employees were surveyed (on areas such as job attitudes, organisational attitudes, work and family measures, and indices of well-being) at 4 time points across a 10 year period during which the company experienced various kinds of organisational change: a difficult financial period, several large downsizing events, the implementation of new technologies, and a move toward a 'flatter' managerial structure. | <ul style="list-style-type: none"> - Authors state that although they cannot disentangle the relative contributions of the company's economic, new work processes, or the change in management approach to the rebound in work attitudes at Time 4, they believe based on their qualitative data, that each played a part in the rebound. - Some attitudes and orientations did not return to Time 1 levels: Workers never quite regained their original levels of job involvement or organisational commitment. | Causality cannot be inferred. |
| Hintzen et al. 2009 Healthcare | Lean | <ul style="list-style-type: none"> - Use of '5S' tool (sift, sort, sweep, standardise, sustain) and 'value stream mapping'. - Presents estimates but does not include data to back these up. | <ul style="list-style-type: none"> - Benefits of Lean methodology included: - Waste was reduced by over 40% (reduction in outdated products, discontinued medicines). - Errors decreased by 83%: missing doses decreased from 53 to 13.8 per day. - Lean process enabled two technicians to be moved to other areas of work. - Overall: <i>net</i> saving of \$239,256 (costs were \$207,710). | Causality cannot be inferred. |

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
|--|--|---|---|---|
| Jimmieson et al. 2004 Public sector | Regionalization and structural changes | <ul style="list-style-type: none"> - Longitudinal. - Questionnaires were sent to 1,222 employees, 589 completed them at T1 (48% response rate), and 213 completed at T2 (36% of the T1 sample). - Examined psychological well-being, client engagement and job satisfaction via its relationship to efficacy - No measure before the organisational change began. - Perception data. | <ul style="list-style-type: none"> - Employees who perceived higher levels of change-related information and change-related self-efficacy at T1 reported higher levels of psychological well-being, client engagement, and job satisfaction in the early phases of the change process, but these results were not evident on the delayed measures of employee adjustment (2 years later). - Highlights the importance of providing employees with adequate information during times of organisational change and of identifying potential stress-buffering variables that can help employees cope over the long term. | Causality cannot be inferred. |
| Junker 2010 Biochemical Engineering | Kaizen | <ul style="list-style-type: none"> - Pre and post measures. - Study is highly specific. | <ul style="list-style-type: none"> - Following the introduction of Kaizen, lead times from request to delivery were improved and the number of deliveries increased. | Causality cannot be inferred. |
| Knowles et al. 2004 Manufacturing | Six Sigma | <ul style="list-style-type: none"> - Case study of the implementation of the six sigma DMAIC model (Define, Measure, Analyse, Improve, and Control). | <ul style="list-style-type: none"> - Changes to manufacturing processes were 'verified' over a 12 month operating period. - Three major improvements: removal of air bubbles; adjustment of wrapping machines; variability reduction: total cost £13,000 <i>estimated</i> total savings £290,000. - Before improvements, 1 in 5 sweets had to either be scrapped or reworked. After the intervention, this was reduced to one in 10,000. | Causality cannot be inferred. |

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
|---|-----------------------|---|---|---|
| Korunka et al. 2003 Public sector | New Public Management | <ul style="list-style-type: none"> - Measurements were taken at baseline (at least 1 month before onset of the OC in each of the 4 customer service centres), T1 (2 months after OC) and T2 (1 year after OC reflecting long term change). (N=161 datasets available at T2). - Interviews with managers and employee representatives evaluated characteristics of change management. - Questionnaires were completed by employees in small groups in presence of a researcher. | <ul style="list-style-type: none"> - While the implementation of NPM can be considered a success it was accompanied with increases in job strain and mixed results in job satisfaction. - Besides active participation, data confirmed the important function of passive participation (information) as an organisational resource. - Employee participation means not only active participation in decision processes, but also adequate, timely and comprehensive information about the planned changes. | Causality cannot be inferred. |
| Kumar et al. 2006 Manufacturing | Six Sigma | <ul style="list-style-type: none"> - Examines the depth of the porous core before and after improvement to establish changes in defect rate and throughput yield. - Case study has pre and post measures - No details on method used for the literature review or the included studies, but the authors note success factors from 7 studies. | <ul style="list-style-type: none"> - The application of a Six Sigma methodology (DMAIC) led to a decrease in the number of defects in the engine manufacturing process and customer satisfaction and business profitability were improved. | Causality cannot be inferred. |

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
|---|---------------|---|---|--|
| L'Hommedieu & Kappeler 2010 Healthcare | Lean | <ul style="list-style-type: none"> - Very limited sample. Data taken from 7 days before and 7 days after the intervention. - Suggests there was a follow up after 30 days but no data is presented on this. - Uses value stream mapping to define issues with original set up. | <ul style="list-style-type: none"> - Wasted IV (intravenous) drug doses decreased from 1,339 to 853 (from 16.6% to 8.6% of the total doses dispensed). - Subsequent <i>projection</i> that the hospital could save \$8,197 per week (\$426,244 p.a. – 2.6% of total drugs expenditure). - Intervention was to change from two 12-hour batches from pharmacy to four 6-hour batches. This developed more of a Just-In-Time model of delivery. | Causality cannot be inferred. |
| Levine & Toffel 2010 Management | ISO 9001 | <ul style="list-style-type: none"> - Matched sample of ISO 9001 adopters and non-adopters. - Uses secondary data to compare single-plant firms. - 10 year longitudinal study. | <ul style="list-style-type: none"> - ISO adopters have higher rates of corporate survival than non-adopters (0.5% vs. 7.1% disappeared from data sets). - ISO adopters had higher growth rates for sales, employment, payroll, and average annual earning than non-adopters. | Able to suggest a link between ISO 9001 and greater likelihood of survival, but not the direction of possible causality. |

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
|---|---------------------------------|---|---|---|
| McDavid 2003 Policing | Amalgamation of police services | <ul style="list-style-type: none"> - Longitudinal study, surveys were completed by different people at the different time points. - Data sources: documented records of costs, manpower levels, populations and crime rates, findings from 3 community surveys. Interviews were also conducted with senior police officers to corroborate quantitative data and identify issues that were important for understanding the amalgamation process. - Between 1995 and 1999 3 surveys were conducted: a telephone survey (N=803) to establish a baseline for assessing service quality and two subsequent postal surveys in 1997 (N=2,137) and 1999 (N=752). | <ul style="list-style-type: none"> - Findings suggest that overall, amalgamation of police services in the Halifax region is associated with higher costs (in real-dollar terms), lower numbers of sworn officers, lower service levels, no real change in crime rates, and higher workloads for sworn officers. - The largest single response over time was the perception that police services had stayed the same. By 1999 78.1% of respondents indicated that police services had stayed the same. - Interviews with senior officers and police chiefs suggest that the quantitative picture of higher costs and lower service levels is borne out by their experiences. | Causality cannot be inferred. |
| Meyer et al. 2010 Private sector | Layoffs and management changes | <ul style="list-style-type: none"> - Employees completed surveys one month before the change was announced and eight months later (N=334), which examined perceptions and preferences with regard to 4 components of organisational culture (human relations, open systems, internal process and rational goal) as well as affective commitment to the organisation and intention to stay. - Uses perception data/ self-report measures. | <ul style="list-style-type: none"> - Found some support for the hypothesis that employee's commitment and intention to stay with the organisation, both pre- and post-change would be greater when there was a fit rather than a misfit between perceived and preferred organisational culture. | Causality cannot be inferred. |

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
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| <p>Mitki et al. 1997</p> <p>Manufacturing</p> | <p>TQM with a Quality Circle programme</p> | <ul style="list-style-type: none"> - Seven year longitudinal study (1988-1995) of a single company. - Collected data on: (1) statistical data typical of quality measurements (e.g. product quality ratios, customer satisfaction); (2) periodic ethnographic observations; and (3) periodic semi-structured interviews with organisational members regarding their views of the organisation, change processes, activities and mechanisms. - The change process established during the QC improvement programme involved gradual experimentation, careful review and learning from each step and appropriate modification, following the basic experiential learning model. | <ul style="list-style-type: none"> - The continuous improvement effort was built on the success of the previous 5 year QC improvement programme. Organisational members' positive experiences with the effort set the climate and willingness to get involved with the new CI effort. - Other reports have indicated that one of the major barriers in CI implementation is the existing organisational structure. In this study, authors note that the creation of the parallel learning system or the parallel hybrid organisation provided the structural mechanism to overcome this potential barrier. | <p>Causality cannot be inferred.</p> |
| <p>Naslund 2008</p> <p>Management</p> | <p>TQM, Six Sigma, Lean, JIT and BPR</p> | <ul style="list-style-type: none"> - Literature review and systematic abstract search. - Measures publication frequency of articles about different improvement methods. | <ul style="list-style-type: none"> - More recent concepts of Lean and six sigma have mainly replaced, but not necessarily added to, the concepts of JIT and TQM. - Literature offers similar and very general CSFs for all of these methods: e.g. top management support/ the importance of communication and information. | <p>Causality cannot be inferred. This is a review paper that provides a critique of the papers it reviews.</p> |

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
|----------------------------------|---------------|--|---|---|
| Parker 2003 Manufacturing | Lean | <ul style="list-style-type: none"> - 3 year quasi-experimental field study with a non-equivalent control group. - Surveys (N=368) - No objective outcome measures used. | <ul style="list-style-type: none"> - The negative effects of Lean production were at least partly attributable to declines in perceived work characteristics (job autonomy, skill utilization and participation in decision making.) - Lean production should in future be introduced in such a way as to have positive effects on job autonomy, skill use or participative decision making so as to increase the potential positive consequences for employee well-being and motivation. | <p>Study design suggests a causal link between Lean methods and perceived decline in work characteristics, but since the control group is not equivalent to the intervention groups the influence of other factors cannot be ruled out.</p> |

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
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| Parmelli et al 2011 Healthcare | Organisational culture change programmes | <ul style="list-style-type: none"> - Cochrane systematic review. | <ul style="list-style-type: none"> - The review did not identify any studies in this area which met the required quality criteria. | No causal statements can be made as there were no studies which met the criteria. |
| Robertson & Seneviratne 1995 Public and private sector | Organisational change, but no details on individual change programmes | <ul style="list-style-type: none"> - Meta-analysis of 47 studies (16 public organisations and 31 private organisations) examining whether it is more difficult to successfully implement planned organisational change in the public sector than in the private sector. - Grouped outcomes into 3 broad classes of organisational variables according to a theoretical model: work setting, individual behaviour, and organisational outcomes. - This study may have implications for generalising findings from private sector OC to public sector. | <ul style="list-style-type: none"> - Organising arrangements (formal structure, goals, administrative procedures, and reward systems i.e. many of the formalized 'bureaucratic' elements of the organisation) seem to be more readily changed in the private sector than in the public sector. - There seemed to be considerable variation in the impact of public sector interventions on technology variables. - Public sector interventions seem to be equally effective at enhancing both individual development and organisational performance. - It seems more difficult to generate consistent, high levels of change in the organising arrangements, technology and physical setting subsystems of public sector organisations. | The meta-analysis suggests causal links; however it is not clear whether the included studies had comparable control groups so caution in interpreting the findings is needed. |

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
|--------------------------------------|--|--|---|--|
| Rosen et al. 2006 Social care | AIM (enhanced Ability, Incentives & Management feedback) | <ul style="list-style-type: none"> - 48 week longitudinal study comparing the incidence of pressure ulcers during 12 week baseline and intervention and post-intervention periods. - Measured staff adherence to mandated training and incidence of new pressure ulcers during the baseline period compared to the intervention and post-intervention periods. | <ul style="list-style-type: none"> - There was a significant reduction ($p < .05$) in the incidence of stage 2 or worse pressure ulcers during the intervention period (12 weeks). During the two 12 week post-intervention periods when the 3 components of the QI intervention were no longer actively maintained the effect was lost (both of staff completing training and of number of ulcers). | Causality cannot be inferred. |
| Schwappach et al. 2003 Healthcare | EMERGE | <ul style="list-style-type: none"> - Meta-analytical comparison of clinical performance measures (across a number of hospitals) before and after 'hospital specific improvement activities' were undertaken. - Initial measurement at Apr-May 2002, follow up Apr-May 2003. | <ul style="list-style-type: none"> - Across all hospitals, small but significant improvements were achieved in all performance measures. - Over and under prioritisation were reduced. - Time intervals from admission (emergency department) to established diagnosis decreased significantly (12 minutes less). | Causality cannot be inferred. Study design compares performance in hospitals pre and post intervention. |
| Vest & Gamm 2009 Healthcare | Six Sigma, Lean and Hardwiring Excellence | <ul style="list-style-type: none"> - Longitudinal study based on three sets of survey responses and empirical data on productivity derived from returns to at Companies House. - Multiple measures of performance before and after the introduction of the practices. - Covers large number of companies (308) over long period (22 years). | <ul style="list-style-type: none"> - Reviewed studies concluded that the implementation of these strategies were successful in improving a variety of healthcare related processes and outcomes. - Found a total of 19 papers. - The vast majority of included papers had methodological limitations that undermined their results, e.g. weak design; inappropriate analysis, etc. | Causality cannot be inferred. This is a critical review paper that provides a critique of the papers it reviews. |

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
|-----------------------------------|---|--|---|---|
| Waclawski 2002 Business | Large scale organisational change model | <ul style="list-style-type: none"> - Organisational survey data were collected at the start and end of the project from 3,563 employees in 26 geographically dispersed work areas within the retail division of a large organisation. - Survey assessed perceptions of changes and items based on theory: mission and strategy, culture, leadership, structure, systems and management practices. - Survey responses not matched and findings are based on perception data. | <ul style="list-style-type: none"> - Measures impact of seven management practices on productivity. - Finds performance benefits from empowerment and extensive training, with teamwork enhancing the effects of both. - None of TQM, JIT or advanced manufacturing technology has a statistically significant effect on productivity. - Teamwork positively moderates the impact of all other practices. | Causality cannot be inferred. |

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
|---|--|---|--|---|
| Wardhani et al 2009 Healthcare | Quality improvement programmes in healthcare | - Literature review with systematic principles containing 14 papers (13 of which were cross sectional, so without a robust control). | <p>- Findings suggest factors influencing QMS implementation in healthcare settings differed to those factors impacting on manufacturing organisations. Authors suggest the structure and culture of organisations in healthcare may be more complex than in manufacturing.</p> <p>- Identifies six key factors which influence the implementation of quality management systems (QMS):</p> <ol style="list-style-type: none"> 1. Organisation culture 2. Organisation design 3. Leadership 4. Physician involvement 5. Quality structure 6. Technical support | Causality cannot be inferred as most of the included studies did not have a robust control. |
| Yong Kim et al. 2010 Library management | Six Sigma | <p>- Case study of the implementation of the six sigma DMAIC model (Define, Measure, Analyse, Improve, and Control).</p> <p>- Attitudinal as well as empirical measures are used.</p> <p>- Sample sizes either very small or not stated for 'after' measures.</p> | <p>- Information acquisition time reduced from 25.9 to 8.1 days (note: two years data used to generate first figure, sample of 8 cases over one month used for second measure).</p> <p>- User satisfaction with information utilisation increased from 6.74 to 8.46 points on likert scale measure (note: sample of 44 for first measure, no sample size stated for follow up).</p> | Causality cannot be inferred. |

| Study | Change Method | Design | Key Findings | Degree to which causal statements can be made |
|----------------------------------|--------------------|--|--|---|
| Zhao et al. 1999 Policing | Community policing | - Used data from a national survey of police chiefs conducted by the Division of Governmental Studies and Services. A sample of 201 police agencies who returned their surveys in 1993 and 1996 were used. | - The greatest barrier was within the police organisation: 'departmental confusion over what community policing means' ranked highest and 'problems in line level accountability' ranked lowest. | Causality cannot be inferred. |