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# Re-engineering Leicester Royal Infirmary: An Independent Evaluation of Implementation and Impact.



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## Responsibilities

Ian Bowns, Professor R L Akehurst, and Professor Jon Nicholl all contributed to the overall design and the original proposal from SchARR relating to the assessment of the impact of re-engineering on the hospital's performance. Helen Snooks drafted the SchARR proposal, but was not involved in the conduct of the study. Ian Bowns also project managed the overall study, co-wrote this report, and analysed data on the fractured neck of femur study, writing the source report from SchARR.

Alan Brennan led the design of the routine data elements evaluation, undertook its early project management and co-wrote the section on 'Impact on Hospital Performance' in this report. Fiona Sampson amended aspects of routine data design, project managed the later stages of this work, undertook the final data analyses and wrote the final source document of the routine data study. John Hemsley, Michael Kane and Michael Evans undertook the analysis of routine data.

Kate Thomas was involved in developing the proposal for the assessment of performance at the LRI, the design and conduct of the studies on the Menstrual Disorder Clinic and Satisfaction in the Accident and Emergency Department, analysed data on these two studies and wrote the two source reports. Pat Coleman collected and analysed data on patient satisfaction and fractured femur cases. Emma Knowles collected data on the Menstrual Disorder Clinic and fractured femur cases.

Mark Deverill undertook economic analyses which contributed to the overall report and particularly the studies of 'Emergency Entry' (fractured neck of femur) and 'Patient Visit' (Menstrual Disorder Clinic) processes.

The process evaluation conducted by CCSC was developed from a research proposal developed in 1995 by Professor Andrew Pettigrew and Dr Terry McNulty.

In leading the process evaluation on behalf of CCSC, Dr McNulty has examined the re-engineering process over time at a corporate-wide level. In addition, Dr McNulty developed case studies of process redesign within the following specialties and clinical settings: accident and emergency department; orthopaedics, ENT, and Gynaecology.

Professor Ewan Ferlie contributed to the evaluation by case analysis of re-engineering within the Trust's Medical Directorate and the clinical specialties of Gastroenterology, ENT and Gynaecology

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## Executive Summary

### What is BPR?

Business Process Re-engineering (BPR) is an approach to organisational change promising dramatic improvements in business performance. Its characteristic feature is the radical redesign of all of the key processes or systems of an enterprise, with implementation leading to discontinuous improvements in service or product quality and cost effectiveness. This is in contrast with most other approaches to change management, which tend to concentrate on making relatively modest, incremental improvements to existing processes over a prolonged period.

The LRI re-engineering project was one of the first substantial attempts in the public sector in the UK to draw on the theory and practice of BPR. In both supporting LRI as a national pilot site for re-engineering, and in commissioning this study, the Department of Health indicated a willingness to learn more about the implementation and impact of re-engineering in advance of possible further re-engineering throughout the NHS.

### Re-engineering at the Leicester Royal Infirmary

The Leicester Royal Infirmary (LRI) is one of the largest teaching hospitals in England, and at the time of the BPR initiative had an annual revenue budget of around £130 million with approximately 1,100 beds and 4,200 staff. Its activity includes approximately 103,000 inpatient episodes, 120,000 accident and emergency and 400,000 outpatient attendances each year. An unusual feature of the hospital is the relatively high proportion of emergency work undertaken, compared with elective or planned activity (for example, approximately 80% of inpatient cases are admitted as emergencies). The hospital was an early adopter of the clinical directorate management structure in 1986 and attained NHS Trust status on 1st April 1993.

The stated objectives of the re-engineering programme, as outlined in the Hospital's Re-engineering Programme Initiation Document of 1994 were:

- To re-align key healthcare, teaching and research processes so that different ways of working are delivered and the managerial and clinical focus is changed from managing inputs to managing outputs
- To achieve hitherto unachieved levels of service quality for patients, purchasers, students and researchers
- To achieve previously unachieved levels of efficiency
- To provide a working environment in which staff can maximise the deployment of their skills and abilities in delivering excellent healthcare for patients

There were essentially five phases in the history of the re-engineering initiative at the LRI:

- **Origin of the re-engineering programme: September 1992 – July 1994**
- Re-engineering diagnostic services and outpatients: August 1994 – February 1995

- Re-engineering the 'clinical heartlands' of the hospital: March 1995 – August 1995
- Implementation lags the vision: October 1995 - May 1996
- The end of the beginning – incremental revolution: June 1996 onwards

The re-engineering programme is characterised by:

- An ambition to 'transform' the performance of all the key services provided by the hospital
- The LRI approached the NHS Executive and secured initial loans with which to begin re-engineering in earnest. Management at the LRI used this initial loan to begin work on the redesign of two of the generic, 'core' care processes, namely 'Visit' (broadly, out-patient services) and 'Test' (investigations and clinical support services), with the intention of beginning work on other processes at a later date. Apparent success in re-engineering these two processes formed the basis for a further bid for more substantial funding from the NHS Executive. A large (by NHS terms - £4.2 million) investment in the formal re-engineering programme was made between 1994/6
- Initially, a strong adherence to orthodox business process re-engineering, with a specific, dedicated change management programme, employing in full the 'classical' methods of BPR, using external and internal change agents. This included the view at the time that generic, 'core' processes could be re-engineered *sequentially*. Early in 1995, plans were changed to concentrate on the *concurrent* redesign of four revised, 'core' processes (patient 'Visit', 'Stay', 'Emergency Entry' and 'Clinical Support')
- By August 1995, the progress of re-engineering emergency entry processes and patient stay processes in particular was slower than anticipated. Senior managers and management consultants acknowledged that the timescale for realising some of the benefits of re-engineering would need to be extended beyond May 1996. Whilst radical transformation remained the ambition, May 1996 was no longer seen as the end of a major, time-limited change programme, and senior managers within the LRI became committed to the *continuous* re-engineering of the hospital's processes
- An emergent strategy of change, imbued with learning, reflection and the micro-politics of change, saw responsibility for re-engineering shifted from a distinct group of change agents working within a specially created set of change management facilities to one whereby responsibility for re-engineering was more devolved to managers and clinicians within clinical directorates and specialties, supported by a very small dedicated change management infrastructure
- A shift from patient process redesign efforts focusing on the planned redesign of generic 'core' processes to patient process redesign being attuned, in inception, purpose and methodology to imperatives at specialty and directorate levels
- More recently, a reemphasis within patient process redesign efforts to improve the flow of patient processes across specialty and directorate boundaries for key organisational processes relating to emergency and elective care
- A shift of ambition from transformation of organisational processes and performance within two years to a more incremental philosophy of continuous change over a 5-10 year timescale

## Results of re-engineering at the LRI

The LRI was near or at the top of many of the NHS efficiency 'league tables' for provincial teaching hospitals before undertaking the re-engineering initiative – if *improvements* in efficiency were among the goals of this experiment in re-engineering, it is arguable that the LRI would not be the easiest setting to generate such improvements, given its initial position. The key performance and organisational results of the LRI programme are:

- Re-engineering has not transformed the performance of the hospital to the extent and at the pace intended at the outset of the initiative. Quantitative measures suggest that the impact of re-engineering in performance terms is less dramatic than anticipated within formal programme documentation prepared for the NHS Executive at the outset of the programme. None of the initiatives we have studied have achieved the magnitude of benefit that was initially intended. Whilst the intended strategy of re-engineering LRI was radical and revolutionary in ambition and method, the emergent strategy of re-engineering has proven more evolutionary than revolutionary. Change has been more convergent than transformational in its impact on the processes of organising and managing LRI
- It was clearly over-ambitious to attempt to transform the entire organisation in two years. Management theory and experience, as well as the literature on industrial BPR and the more limited literature on hospital re-engineering indicated at the outset that such an outcome was unlikely. Management at the LRI are now of the opinion that this is a 5-10 year goal. The detailed findings at the LRI are similar to the more limited conclusions drawn in other published analyses of BPR in health care
- On a substantial series of indicators of efficiency (measuring the outputs of the hospital in relation to financial inputs) LRI was among the top 2 or 3 teaching hospitals in England even before re-engineering began. From this baseline, the LRI has generally improved its efficiency marginally faster than a peer group of teaching hospitals, whilst broadly delivering the concurrent management agenda (e.g. Patients' Charter)
- The redesign of patient care processes has resulted in cash-releasing savings of approximately £5-600,000 per annum (less than 0.5% of the hospital's annual revenue), mainly as a result of staffing changes in out-patients. Although less than originally intended, such savings are significant
- Overall the impact of individual projects upon patient care has been variable against their original targets. Re-engineering has, however, generated important service improvements:
  - Eliminating duplicate or redundant documentation
  - Clinic redesign
  - Near patient testing
  - Laboratory process redesign
  - Revised operating theatre procedures
  - Endoscopy service redesign



- Supply process redesign
- New roles (e.g. Process Manager) and multi-skilling (e.g. in near patient testing or operating theatres)
- Many of the specific projects pursued from 1995-1998 at the LRI are similar in nature and scope to isolated projects undertaken at other hospitals – LRI have, however, been able to undertake many more such projects simultaneously than would have been possible without re-engineering
- Where service improvements have been secured, they have usually been sustained
- Re-engineering has impacted on organisational form, roles and hierarchy within LRI. Re-engineering has contributed to change in personnel and processes at senior levels of management within LRI. Whilst retaining the previous clinical directorate structure, process management has been introduced into LRI
- Whilst some features of the re-engineering programme have not been durable, the analysis and redesign of patient care processes is an enduring feature of the re-engineering initiative within LRI. Evidence about ongoing process redesign, continued motivation to change and learning about how to change suggests that future effects of re-engineering within LRI cannot be ruled out, though it is unclear whether future change will meet the initial aspirations for the re-engineering programme

## The lessons for the NHS

Important lessons for the NHS are that:

- A re-engineering, or other major change initiative can act as a catalyst for service improvement
- 'Programmatic' change initiatives (i.e. major change initiatives with their own separate managerial infrastructure) have particular, inherent problems - re-engineering is only one example of this approach to change management
- Some re-engineering techniques, particularly 'process thinking' (the analysis and redesign of patient care processes) can be used successfully to improve patient care
- External management consultants can support change, but a deep understanding of the NHS environment is critical to their impact. Their main contributions are to act as catalysts for change and to facilitate the introduction of specific change management techniques (e.g. process redesign); these objectives may be achieved with a change-management more modest investment than that seen at the LRI
- Process re-engineering in hospitals is more complex than in general industry, because of the great diversity of patient groups (or 'product lines') in health care - the simultaneous identification and redesign of 'core' or generic processes is extremely difficult because of the important differences between different patient groups
- Change is highly context sensitive. The continuity of support by senior management is necessary, though not sufficient, to re-engineer in an NHS setting

- Effective redesign of patient care processes requires sustained leadership of change and support for change by a critical mass of clinicians involved in delivering care to the relevant patients

We would recommend that NHS institutions should only embark upon any major programme of change that is based upon any specific, programmatic approach with careful consideration of:

- The applicability of the core ideas of the particular approach (e.g. BPR) to the health care setting
- The current circumstances and state of readiness of their particular organisation for any such approach
- Their willingness and capacity to adapt the particular change-management ideas, tools and techniques to local circumstances

## The Evaluation

This section describes the commissioning, and outlines the nature and methods, of the independent evaluation of this major pilot project.

### Origin of the evaluation

During late 1994, discussions took place between the School of Health and Related Research (SchARR) at the University of Sheffield and officers of the Research and Development Directorate at the Department of Health on the nature and funding of the intended evaluation. These discussions initially concentrated on research methods aimed at assessing the extent to which BPR had transformed the performance of the LRI. However, it is also important to determine the circumstances which initiated the BPR programme, describe the process of change, and assess the factors and forces which determined the success or failure of the programme or its components. SchARR sought a partner with expertise in the qualitative study of organisational change to address these issues, namely the Centre for Corporate Strategy and Change (CCSC<sup>‡</sup>) at the University of Warwick. A brief and contract for the evaluation was agreed early in 1995 and work commenced immediately.

### Key research questions

The agreed research brief sought to answer four questions:

- Would the performance of the LRI be radically transformed by the end of the BPR programme?
- Would any changes in performance be sustainable?
- Would any improvements in performance be transferable to the rest of the NHS?
- Would the BPR programme 'pay for itself'?

### Methods

In order to answer such complex questions a range of *quantitative* and *qualitative* research methods were employed. It is not valid, however, to see either element as dominant. We have employed a 'partnership' model<sup>1</sup>, with quantitative and qualitative research methods addressing those research questions to which they are best suited. Often, both approaches are required to provide the fullest possible answer to a research question. Operationally, the partnership of SchARR and CCSC has involved joint team meetings on approximately a quarterly basis, common case studies, and this integration of findings.

#### Methods for assessing changes in hospital performance

The overall performance of the hospital was assessed in terms of changes to the quantity, quality and cost/efficiency of the healthcare delivered. These factors were assessed using

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<sup>‡</sup> From 5<sup>th</sup> November 1998, CCSC is now the Centre for Creativity, Strategy and Change.

routine hospital and health authority data sources<sup>2</sup>, specific monitoring data established as part of the BPR programme<sup>2</sup>, and more detailed data collected independently on a narrower range of particular care processes.

To assess the extent to which process redesign could have resulted in dramatic improvements in patient care a team of researchers carried out a series of both quantitative and qualitative case studies. These covered redesign initiatives across the range of generic processes originally envisaged as part of the re-engineering programme. As it would clearly have been impossible to subject every project to detailed scrutiny, an illustrative range of projects or specialties were selected for more detailed study.

Detailed quantitative studies were planned in order to reflect the different 'core' processes that the re-engineering programme was seeking to redesign, and to complement the qualitative case studies outlined in the following section. In addition, it was necessary to select large, homogenous patient groups, preferably reflecting the management of common conditions presenting to NHS hospitals. These studies were undertaken in relation to

- the care of patients with hip fracture ('emergency entry' process)<sup>3</sup>;
- the newly established Menstrual Disorders Clinic ('visit' and 'stay' processes)<sup>4</sup>;
- surveys of patient satisfaction with the Accident and Emergency service ('visit')<sup>5</sup>.

Economic analysis concentrated on the direct financial costs of the BPR programme, a range of non-financial 'costs' arising as a result of the initiative, and changes in the efficiency of the hospital.

The biggest challenge in undertaking this evaluation lies in the attribution of any changes in performance to the BPR initiative. Where possible, we not only compared data before and after the implementation, but also sought comparable data from other hospitals. In the case of high level routine data a group of 'peer' hospitals was used. For the studies of 'Emergency Entry' and the Patient Satisfaction Surveys, comparable data were sought from two similar teaching hospitals.

In addition, a limited number of semi-structured interviews were undertaken during 1998 with a range of external 'stakeholders', including local general practitioners, officers of the Leicestershire Health Authority and the NHS Executive, and the Community Health Council.

The methodology for explaining impact

The overall aim of the 'process evaluation'<sup>6</sup> conducted by CCSC is to describe and analyse the antecedents, context, implementation and impact of re-engineering, to derive some of the critical and potentially generic lessons regarding the management of change within the NHS.

Complementing the quantitative methods applied by SchARR, the qualitative approach of CCSC is more appropriate to this aim, examining re-engineering as a dynamic phenomenon in the context of the hospital including the intermediate and less tangible effects of the change programme. The CCSC approach to this evaluation is characterised by the collection of qualitative data, both real-time and retrospective. The ambition of the re-engineering programme required an evaluation design able to meet the twin challenges

of analytical breath and depth. Breadth was addressed in terms of an analysis that was capable of evaluating the process of re-engineering across the whole hospital. Depth in terms of an analysis with the power to discriminate and explain any variation in the development of re-engineering throughout the hospital. The twin challenges of breadth and depth have been faced by designing an evaluation of the phenomenon of re-engineering that crosses, simultaneously, the three levels of analysis: corporate, clinical directorate and clinical setting. Within clinical settings, multiple comparative case studies have enabled CCSC to focus on planned change interventions designed to re-engineer patient processes within clinical settings and assess behavioural and organisational dynamics associated those interventions. Qualitative studies examined projects across a range of specialties; General Medicine, Gastroenterology, Orthopaedics, Gynaecology, Accident and Emergency, and Ear, Nose and Throat. These were selected to cover patient care processes, across the four 'core' processes LRI intended to redesign the range of specialties in the hospital and to complement the quantitative studies planned by SchARR.

From July 1995 until March 1998, CCSC researchers collected data from four main sources: documents and archival data; interviews with key individuals; notes taken from informal conversations; and observational data gathered at meetings.

One hundred and forty-four in-depth interviews: the sampling strategy has been theoretical and judgmental rather than statistical. Respondents have been selected to elicit the views and experiences of a range of participants within LRI at the three levels of analysis identified earlier, e.g., corporate; clinical directorate and the clinical setting. Respondents have been from clinical and managerial groups across the hospital at all levels, members of the re-engineering programme, management consultants, clinicians.

Observation of meetings within LRI: over 50 meetings have been attended at which notes have been taken as a record of talk and behaviour. The meetings span the following corporate decision fora as well as directorate, specialty and project for:

- Re-engineering Steering Group;
- Re-engineering Management Group;
- Re-engineering Team Leaders Review; the Medical Directorate;
- Surgical Directorate; the ENT Re-engineering Working Party;
- Obstetrics and Gynaecology Re-engineering Steering Group;
- Orthopaedic Process-link Group.

Special events organised as part of the re-engineering initiative were also observed, for example, re-engineering training events, seminars, workshops, conferences and strategic direction events for the Trust.

Archival data has been sought and gathered about: the history of the hospital, especially since the transition to NHS Trust status; the introduction of clinical directorates; prior quality improvement initiatives within the hospital and the development of the re-engineering programme. Data have also been collected as a result of numerous informal conversations that took place as a consequence of our regular presence within the research over a lengthy time period. Whilst these conversations were not taped and

transcribed they yielded important data which have served as an important follow-up or precursor to interviews and meetings.

## The BPR Phenomenon

### What is BPR?

Business Process Re-engineering (BPR) is an approach to organisational change promising dramatic improvements in business performance. Its characteristic feature is the radical redesign of all of the key processes or systems of an enterprise, with implementation leading to discontinuous improvements in service or product quality and cost effectiveness. This is in contrast with most other approaches to change management, which tend to concentrate on making relatively modest, incremental improvements to existing processes over a prolonged period.

In its 'classical' form, as described by Hammer and Champy in their seminal work on the approach<sup>7</sup>, BPR is defined as:

"The fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed." Hammer & Champy, 1993, page 32

Successful classical BPR was thought to have the following characteristics:

- It is based on the view that significant improvements in business performance can only be achieved by the redesign of 'core' business processes, starting only with a 'blank sheet' and the business objectives;
- The full benefits of the approach can only be realised if all of the business processes within the entire enterprise are redesigned, as they are connected at various points across the organisation;
- BPR can only succeed if redesign and implementation are rapid (i.e. completed in two years), otherwise the inertia associated with existing organisational culture and processes will prevent eventual success.
- It is a 'programmatic' approach to change, requiring specific, dedicated people, organised in teams, earmarked resources, and new structures and approaches, all distinct from the normal running and organisation of the enterprise. BPR prescribes as much about the process of change as it does about the change of processes.

For example, Hammer and Champy specify five key roles in BPR:

- *The Leader* – a senior executive who champions the programme;
- *The Process Owners* – senior line managers who assemble the team, motivate and advise;

- *The Re-engineering Team* – a group of 5-10 people, from within and outside the organisation, capable of thinking radically about processes.;
- *A Steering Committee* – responsible for direction and oversight;
- *A Re-engineering Csar* – the Leader's Chief of Staff, enabling and supporting each process owner, and co-ordinating the programme.

Hammer and Champy prescribe that the process of BPR starts with the identification of business processes by 'process mapping' organisational activities and depicting how work flows through the company. The next step is to decide which processes to redesign and in what sequence. Having identified a business process to redesign, they advise that a process owner be designated, a re-engineering team convened and the current process understood. Process redesign can only take place following process analysis ('diagnosis') leading to better understanding the performance of the current process. Process redesign involves 'reenvisioning' the company and 'inventing' new ways of doing its work. The final stage is to implement the redesigned processes. The re-engineering team are required to 'sell' change to employees and senior managers to communicate why the organisation needs to re-engineer and what kind of organisation the company needs to become.

The following offers a shorter summary of the approach:

"Real improvement comes from changing systems, not changing within systems."<sup>8</sup> Berwick, 1997

## BPR in practice

Many businesses embark on 'BPR' in response to either a major perceived weakness within the enterprise or a significant threat from the external business environment. Despite the existence of the 'classical' form, many of the initiatives that purport to be BPR are variants on this form. For example, many projects do not attempt to re-engineer an entire organisation, merely one process or department. It is, therefore, important to assess whether any BPR initiative is of the full, 'classical' form or a variant<sup>9</sup>, or even an initiative that is BPR in name only.

BPR has also become closely associated with the implementation of information technology. Though this is partly due to the original research from which the BPR phenomenon arose (the 'Management in the 90s' studies undertaken by MIT<sup>10</sup>), it probably has more to do with the way many management consultants have undertaken BPR work.

Indeed, BPR is often confused with other approaches to change management, or employed with other approaches in a broad programme of change. While many approaches have much in common, most have some distinctive features<sup>11</sup>; those of BPR being a focus on the rapid, radical change of all business processes or systems.

As experience has grown, and partly in recognition of the apparently high failure rate, the theory and practice of BPR has developed and adapted. Change has also resulted from criticism of 'classical' BPR, including:

- The definition of 'core' processes is vague<sup>12</sup>;

- There is a contradiction between the 'top-down' BPR approach and the simultaneous intention to empower staff to devise and implement new processes<sup>13</sup>;
- That BPR is a 'technically rationalist' view of change<sup>14</sup>, ignoring the inevitably political nature of all organisations.

Given the nature of BPR programmes, it would not be surprising for a significant proportion to fail. This factor, together with the difficulty of identifying genuine BPR initiatives and a likely bias in the publication of the results of BPR work, should all be taken into account when considering the apparently high failure rate for BPR. Despite this, only perhaps 50% of serious BPR initiatives achieve the type and scale of benefits intended<sup>15</sup>.

## BPR in hospitals

"Few hospital re-engineering articles or professional presentations have included concrete documentation of improved quantifiable quality, service, or financial outcomes."<sup>16</sup>

Against the background of the widespread implementation in the early 90s of BPR in industry, it is not surprising that the approach has been tried in hospitals. However, most of the published reports of its use in hospitals are from North American institutions, and very few appear in the peer-reviewed scientific literature. Some accounts are theoretical prescription<sup>17,18</sup> or report the plans and intentions of projects teams with respect to their own initiatives. Few hospitals have attempted to re-engineer across the entire institution<sup>19,20,21,22,23</sup>, and most reports describe work on one<sup>24,25,26</sup> or two<sup>27</sup> departments, processes or roles<sup>28</sup>. As in general industry, several published initiatives focused closely on information management<sup>29,30</sup> and technology<sup>31</sup>. A number do report quantifiable benefits<sup>32</sup>, usually established on a 'before and after' basis. Unfortunately, the descriptions of the data collected are usually brief, making it difficult to assess the validity of the conclusions. Finally, it is likely that there is a publication bias in favour of reports showing positive results of BPR.

Despite these reservations, the published literature suggests that:

- Patient care processes can be redesigned, producing measurable improvements in the process of care, though improved clinical outcomes are harder to establish<sup>33</sup>;
- Process redesign is often employed as only a part of a quality improvement initiative<sup>34,35,36</sup>;
- Rapid change seems to be easier to achieve when the scope of the project is restricted to a single process or department<sup>37</sup>;
- More widespread change may not generate significant benefits in less than five years<sup>38,39</sup>;
- Quantifiable benefits in terms of the quantity or quality of care delivered or cost reductions are almost always more modest than plans or pilot studies suggest<sup>20,40</sup>.

There has historically been a close relationship between the introduction of new technology, particularly information technology, and BPR. There is strong evidence from industry in general that information technology will yield few benefits unless work



processes or practices are also changed<sup>41</sup>. Technological developments also give opportunities to change working practice in ways that cannot be foreseen. Indeed, the use of computer networks to speed up the ordering of tests and the delivery of test results in hospitals is now widespread<sup>42</sup>. There are also isolated instances where information technology has had a direct impact on clinical practice<sup>43,44</sup>.

At the start of the re-engineering initiative at the LRI and our evaluation of it, there were few published accounts of attempts to apply re-engineering to an entire hospital, with only a handful being published subsequently. We are not aware of any publications of independent evaluations of such initiatives on the scale reported here.

## A History of Re-engineering at the Leicester Royal Infirmary

This section describes the origins and history of the initiative at the LRI.

### The hospital

The Leicester Royal Infirmary (LRI) is one of the largest teaching hospitals in England, with an annual revenue budget of around £130 million with approximately 1,100 beds and 4,200 staff. Its activity includes approximately 103,000 inpatient episodes, 120,000 accident and emergency and 400,000 outpatient attendances each year. An unusual feature of the hospital is the relatively high proportion of emergency work undertaken, compared with elective or planned activity (for example, approximately 80% of inpatient cases are admitted as emergencies).

The Chairman of the Trust was appointed in 1992, the Chief Executive in 1990 having been the hospital's Deputy General Manager. The hospital was an early adopter of the clinical directorate management structure in 1986 and NHS Trust status was granted on 1st April 1993. Prior to the re-engineering programme there were a total of eight clinical directorates in addition to a range of support services and management functions. Each directorate had a clinical director, a business manager, a senior nurse/midwife, and heads of clinical services and specialties within the directorate. Subsequent modifications to these organisation and managing arrangements are commented on throughout this report.

### Phases of re-engineering at the LRI

There are essentially five phases in the history of the re-engineering initiative at the LRI:

1. Origin of the re-engineering programme: September 1992 – July 1994
2. Re-engineering diagnostic services and outpatients: August 1994 – February 1995
3. Re-engineering the 'clinical heartlands' of the hospital: March 1995 – August 1995
4. Implementation lags the vision: October 1995 - May 1996
5. The end of the beginning – incremental revolution: June 1996 onwards

Table 1 gives a more detailed history of key milestones in the initiation and development of the programme.

REENGINEERING AT THE LEICESTER ROYAL INFIRMARY - AN INDEPENDENT EVALUATION OF  
IMPLEMENTATION AND IMPACT

Table 1: The LRI Re-engineering Programme: Milestones of a Planned Change Intervention

September 1992	LRI initiate five projects as part of Trent Health's Project Sigma initiative designed to improve the quality of out-patient services.
July 1993	Senior Managers and Clinicians use the concept of re-engineering to make sense of variable results of five project sigma initiatives.
October 1993	A concept paper about re-engineering is prepared by LRI and King's Healthcare. The paper is part of formal submission to the NHS for the Trusts to pilot the application of re-engineering to healthcare
November 1993	Clinical, Managerial and Trade Union Leaders are introduced to the concept of re-engineering at a strategic direction 'time-out'.
January 1994	A programme initiation document titled 'Re-engineering the healthcare process' is prepared solely by LRI. The document invites NHS Management Executive to sponsor the re-engineering intervention at LRI.
July 1994	The Report of a Scoping Study identifies core organisational processes to be re-engineered, programme objectives and timescales.
July 1994	NHS Executive recognise, with financial support, LRI as the national pilot site for re-engineering.
August 1994	The re-engineering intervention formally commences. Work starts on the redesign of the core processes of patient visit and diagnostic test processes.
January 1995	LRI seeks and receives continuing support of the NHS Executive to move onto the next phase of re-engineering.
March 1995	Four new re-engineering laboratories are created for the purposes of redesigning the four core processes of 'emergency entry', 'patient stay', 'patient visit', and 'clinical support services'.
October 1995	The process of dissolving re-engineering laboratories starts as part of a process that sees formal responsibility for re-engineering shift from a centralised programme to clinical directorates.
May 1996	The Re-engineering Steering Group recognise that re-engineering will have to continue beyond May 1996. Senior management of the hospital are committed to continuing to re-engineer the hospital. May 31st, the date for formal completion of the programme is spoken of as 'the end of the beginning'.
August 1997	The language of radical performance transformation has been replaced by talk amongst leaders of the re-engineering intervention of 'incremental revolution' An internal report labelled 'Evaluating the outcomes of the Leicester Royal Infirmary Re-engineering Programme' concludes that:  <i>"...change activity will continue and the goals of the programme are likely to be achieved. However the pace of change is more incremental and uneven than originally expected"</i> (Leicester Royal Infirmary NHS Trust, August 1997:29)

(McNulty, 1998)

The origins of the re-engineering programme (September 1992 – July 1994)

The re-engineering initiative at LRI commenced in earnest in 1994, following the completion of a previous quality initiative which successfully established a 'one stop' or single visit clinic in the speciality of neurology. This project was the most prominent of a series of five projects undertaken as part of Trent Health's Sigma initiative.

During this period, the hospital's Chief Executive together with other senior managers and clinicians used the concept of re-engineering to 'make sense' of the success of the neurology project. Project Sigma was one of several factors which shaped the genesis of the re-engineering programme within LRI between 1992 and 1994. Other explanatory antecedent factors and conditions are that the Trust was financially hard-pressed, yet investment was needed to maintain and develop the hospital site and medical equipment. In the context of an annual cycle of cost-improvement, and the NHS internal market, LRI was under pressure from national government and local purchasers to improve the

volume and quality of services. The onset of hospital trust status in April 1993 required more explicit consideration of the strategic direction for the hospital. At senior management level of the LRI individuals' interpretation of the financial, political and social imperatives facing the Trust at this time was that the LRI was faced with having to do more work, of better quality, within tighter financial circumstances. Re-engineering was perceived as a 'radical solution' to meeting intensifying internal and external demands upon the clinical and managerial performance of the hospital. Re-engineering was championed as a methodology through which the hospital could both increase the volume, quality, efficiency and effectiveness of patient care, and improve processes of teaching and research, within an increasingly financially constrained environment.

Senior management at the LRI developed plans for a wholesale re-engineering initiative. The LRI published a Scoping Study in July 1994<sup>45</sup>, which was enthusiastic about the potential to redesign processes to:

- Reduce process times *by up<sup>§</sup> to 80%*;
- Eliminate *up to 50%* of diagnostic tests;
- Reduce patient delays by two thirds;
- Reduce the length of patient stays by 20%;
- Create a national centre of excellence.

The stated objectives as outlined in the Hospital's Re-engineering Programme Initiation Document of 1994<sup>46</sup> were:

- To re-align key healthcare, teaching and research processes so that different ways of working are delivered and the managerial and clinical focus is changed from managing inputs to managing outputs;
- To achieve hitherto unachieved levels of service quality for patients, purchasers, students and researchers;
- To achieve previously unachieved levels of efficiency;
- To provide a working environment in which staff can maximise the deployment of their skills and abilities in delivering excellent healthcare for patients.

With the explicit support of Michael Hammer for their intention to rapidly re-engineer the entire institution, the LRI approached the NHS Executive and secured initial loans with which to begin the programme.

Re-engineering diagnostic services and outpatient clinics (August 1994 – February 1995)

Management at the LRI used this initial loan to begin work on the redesign of two of the generic, 'core' care processes, namely 'Visit' and 'Test', (see below) with the intention of beginning work on other processes at a later date. This reflects the view at the time that

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<sup>§</sup> Our emphasis. These terms are imprecise, making it difficult to interpret achievement against these targets.

the core processes could be re-engineered *sequentially*. Apparent success in re-engineering these two processes formed the basis for a further bid for more substantial funding from the NHS Executive.

Re-engineering the 'clinical heartlands' of the hospital (March 1995 – August 1995)

Early in 1995, plans were changed to concentrate on the *concurrent* redesign of four revised, 'core' processes. In addition to diagnostic and visit processes, the concept of redesign was extended to the 'core' processes of 'emergency entry' and 'patient stay' (see below). Administrative processes were also to be re-engineered. The main reason for this change of approach was the perception, based upon early experience, that the hospital's processes were inter-connected and that the maximum benefit could only be gained if they were all changed rapidly and concurrently. The revised plan was submitted to the NHS Executive and a further substantial loan was agreed. This document<sup>47</sup> retains much of the ambition of earlier documents, such as reducing staff costs in the 'Visit' setting by 20% in two years, and re-paying the entire loan in approximately four years. To quote:

"By the end of this programme, The Leicester Royal Infirmary will have transformed the way it provides healthcare, teaching and research.... The re-engineering programme has already demonstrated that significant improvements can be achieved quickly and at reduced cost." LRI, 1995

The funding from the NHS Executive was conditional upon an independent external evaluation of the initiative, and an extensive exercise by LRI to disseminate the lessons learned during the project, largely by a series of workshops.

This period marked the start of a programme to re-engineer both patient care and other processes across the entire hospital, which was to be completed by mid-1996. In practice, the scale and scope of redesign activity increased enormously and at great pace after March 1995. Evidence from this period suggests 50-70 redesign projects spanning different directorates and specialties within LRI. However, this increased amount of change activity within LRI made the re-engineering programme more complex to manage.

Those responsible for the programme became increasingly concerned about the integration and coherence of the plurality of redesign projects within LRI. It was not always apparent how redesign interventions at specialty and directorate levels related to the four 'core' processes previously identified. Within clinical directorates and specialties managers and clinicians questioned the idea that patient services could be interpreted as generic core processes to be redesigned and 'rolled-out' throughout LRI. In practice, redesign interventions were increasingly tailored to needs of particular patient groups and clinicians. Difference was observable in the rate and pace of re-engineering across specialties and directorates within LRI. For example, progress redesigning care processes within the surgical specialties was variable whilst the redesign of in-patient service within medical specialties had not started. Management consultants expressed concern that senior managers within the hospital could not force consultants to accept change.

By August 1995, the progress of re-engineering emergency entry processes and patient stay processes in particular was slower than anticipated. Senior managers and management consultants acknowledged that the timescale for realising some of the benefits of re-engineering would need to be extended beyond May 1996. However, faced

with limited and reducing (as planned) financial and staffing resources an extended timescale presented difficulties. By the end of this period responsibility for re-engineering was shifting from a centralised team of re-engineers within laboratories to managers within clinical directorates.

Implementation lags the vision (October 1995 - May 1996)

During this period, leaders of the re-engineering programme dismantled the re-engineering laboratories and responsibility and accountability for individual redesign projects was transferred to directorates and specialties. A number of re-engineers, including three of the four re-engineering laboratory team leaders were appointed to 'process management' roles within clinical directorates to provide leadership of patient process redesign. The appointment of a laboratory team leader to the post of Patient Process Director, alongside the Clinical Director within the A&E Orthopaedic Trauma Directorate represented the first step toward creating 'process management' at the expense of 'functional management' at directorate and specialty levels. Progress had been variable but was most marked in the areas of patient testing and some outpatient clinics. It was acknowledged that the LRI would not be a re-engineered organisation by May 1996.

Whilst radical transformation remained the ambition, May 1996 was no longer seen as the end of a major, time-limited change programme, and senior managers within the LRI became committed to the *continuous* re-engineering of the hospital's processes. The philosophy of early 1995, of 'big-bang' organisational transformation had been tempered by the experience of implementation over the preceding 12-18 months.

The end of the beginning – incremental revolution (June 1996 onwards)

This phase of the re-engineering programme marked a further fundamental change in the philosophy of re-engineering at the LRI. Senior managers, including the chief executive and medical director continued to communicate to the organisation their belief in targeting organisational processes in pursuit of radical performance improvements. Process thinking and process management remained particularly enduring features of the re-engineering intervention, though some other features and manifestations of earlier phases of the re-engineering intervention disappeared.

The shift of responsibility for process redesign from a separate facility based on 're-engineers' working in 're-engineering laboratories' into the mainstream managerial and organisational arrangements of the hospital was completed. Re-engineering laboratories were by this time fully dissolved. All that remained of the centralised re-engineering support promoting and supporting process-based was a 'Centre for Best Practice', consisting of 4-5 former re-engineers, including the Re-engineering Programme Leader, with clerical support. These individuals were now working without the support of the firm of external management consultants, who had already left the organisation as planned.

Specially created committees (discussed later) for managing the re-engineering intervention were dissolved. The Re-engineering Steering Group met for the last time in May 1996. The Re-engineering Management Group met for the last time in January 1997. Since 1997, the change agenda associated with the re-engineering intervention has been subsumed as part of the remit of a reconstituted Hospital Executive Group. At specialty and clinical directorate levels, the re-engineering change agenda has been subsumed into new 'process management' arrangements. Following consultation with clinical and management colleagues, the chief executive's proposals for a radical management reorganisation were tempered in preference for a more incremental approach to structural

change. In this instance, incrementalism meant introducing process management within the existing pattern of clinical directorates. The approach was subsequently labelled by its advocates as 'revolution by evolution'. The word 're-engineering' largely disappeared from parlance within LRI.

Though variable, there remained in this period momentum for process redesign at senior management, clinical and directorate specialty levels of LRI. Many process redesign interventions dating back to earlier phases of the re-engineering programme continued. New process redesign interventions started, post May 1996, addressing processes of patient care, sometimes explicitly using methodologies and expertise developed during earlier phases of the re-engineering programme. Some of the new projects developed in this period were a deliberate attempt by some senior managers and clinicians within LRI to both increase the coherence of change initiatives across specialties and clinical directorates and address recurring problems facing the hospital relating to processes of patient admission into hospital and discharge from the hospital. For instance, process redesign is underway designed to better plan and manage the flow of elective and emergency patients into, around and out of the hospital. Indeed, some senior managers heralded these efforts as a return to thinking about change in terms of generic 'core' processes at the corporate level. These projects were ongoing as our fieldwork was completed in mid 1998.

### Three generations of core processes

This section describes the evolution of thinking on 'core' processes at the LRI. From the start of the formal re-engineering initiative in 1994 to the completion of our evaluation in 1998 there were three distinct approaches to the definition of 'core' processes at the LRI (Table 2). The first two approaches shared the idea that there are *generic*, 'core' processes that can be re-engineered centrally in a 'laboratory' setting and subsequently rolled-out into directorates and specialties. The third sees a fundamental departure, based on recognition of the distinctive features of each specialty and patient group. Process redesign came to be organised more around the distinctive features of individual specialties, patient groups and consultants rather than guided by an overarching logic of 'core' patient care processes.

In the initial stages, LRI attempted to follow closely a 'classical' BPR programme. A multidisciplinary team of professionals from within the LRI, supplemented with external management consultants, was established to redesign each of the core processes. The work began by defining a vision of the ideal process in each of the 'core' processes. Existing processes were mapped and the baseline performance of these processes was measured and, if possible, compared with performance elsewhere ('benchmarking'). Next, attempts were made to design new, radically different and frequently simpler processes. These were then to be piloted, with a view to rolling out successful processes across the entire hospital. However, progress across these 'core' processes was variable and these orthodox stages were not always completed.

The processes were given novel descriptive titles, in order to dissociate them from the usual NHS descriptions and thinking of the existing processes with which they most closely corresponded.

Table 2: Three generations of definition of processes at the Leicester Royal Infirmary

Stage	Start	Definition of processes
Scoping Study	May 1994	<ol style="list-style-type: none"> <li>1. Patient Clinical Crisis-to-Care Process;</li> <li>2. Patient Visit Process;</li> <li>3. Patient Stay Process;</li> <li>4. Patient Test Process;</li> <li>5. Clinical Horizon Process;</li> <li>6. Marketplace Management Process.</li> </ol>
Summary Report	January 1995	<ol style="list-style-type: none"> <li>7. Patient Visit;</li> <li>8. Patients Stay;</li> <li>9. Emergency Entry;</li> <li>10. Clinical Support Services.</li> </ol>
Devolution to directorates and specialties	From October 1995	No formal definition of core processes employed. Specific projects developed to address particular challenges.



#### Scoping Study - 1994

This document described the six core processes seen as central to the care of patients:

- Patient Clinical Crisis-to-Care Process (described as care on demand, with benefits measured in time, teaching and research opportunities, mortality and morbidity rates);
- Patient Visit Process (planned care not requiring a hospital bed, benefits in terms of cycle time, process time, clinical outcome, teaching and research opportunities and number of visits per patient);
- Patient Stay Process (planned care requiring a bed, benefits similar to 'Visit', with the re-admission rates, bed utilisation rates and length of stay);
- Patient Test Process (benefits in terms such as order to availability interval, appropriateness of test and percentage of tests adding value);
- Clinical Horizon Process (the renewal of hospital staff knowledge and skills, including teaching and research);
- Marketplace Management Process (essentially, managing the hospitals reputation and partnerships).

#### Summary Report – January 1995

The four revised processes were variants of processes identified in the initial plan:

- Patient Visit;
- Patients Stay;
- Emergency Entry (successor to 'Crisis-to-Care');
- Clinical Support Services (incorporating 'Test' and other support services).

Two processes which would have been re-engineered under the initial plan, 'Clinical Horizon' and 'Marketplace Management', were not pursued at this stage though the teaching and research implications of re-engineering were sometimes subject to discussion within the Re-engineering Steering Group, and to a lesser extent the Re-engineering Management Group.

Devolution to directorates and specialties - October 1995

Looking back on this stage of the programme, the hospital came to believe that<sup>48</sup>:

"Patient groups tend to have specific needs and unique characteristics which require highly customised patient process redesigns. Every redesign has to be further customised to the preferences of the individual (medical) clinician." LRI, 1997

Thus, even before the formal completion of the initial two-year project, the nature of the exercise had changed significantly. From early 1995 onwards LRI recorded a dramatic increase in the number of projects being undertaken, rising from fewer than 10 projects at the end of 1994 to a stage where, from the end of 1995, there have been between 60 and 70 projects in progress at any one time. Since 1994, the LRI has embarked upon, though not necessarily completed, at least 140 redesign projects, though many of these are closely related interventions, perhaps best described as 'sub-projects'. By April 1996, the LRI recognised that re-engineering would continue beyond the formal programme completion in May 1996.

## Re-engineering programme organisation and management

### Formal Re-engineering Committees

The formal organisation of the re-engineering programme closely resembled the structure of committees and roles suggested by Hammer and Champy. Three groups were dedicated to the re-engineering intervention. They were labelled: the Re-engineering Steering Group; the Re-engineering Management Group; and the Re-engineering Team Leaders Review. Established in May 1994, the Re-engineering Steering Group was a formal sub-committee of the board, meeting on a monthly basis to monitor and review progress of the re-engineering intervention. The group was chaired by the Chairman of the Trust and reported to the Trust board. The Chief Executive of the Trust attended meetings of the group. In addition, the Steering Group comprised of major internal and external stakeholders. Internal stakeholders were for instance, clinical directors and executive directors of the Trust. Major external stakeholders included representatives of the NHS Executive, the local Health Authority, the Audit Commission, Leicester University, the Community Health Council and members of the evaluation team. Also in attendance at meetings of the Steering group were the Re-engineering Programme Leader and leaders of the Re-engineering laboratories and management consultants. Other individuals with re-engineering responsibilities attended meetings of Steering Group on an ad hoc basis to report progress with particular interventions. The group met for the last time in May 1996. The group was dissolved in line with the formal date for completing the re-engineering programme.

The Re-engineering Management Group met fortnightly to track progress of the programme and resolve issues to do with the interface between re-engineering and broader operational and management issues within the Trust. Established in February 1995 the group was chaired by the Chief Executive. Relative to the Steering Group, the Management Group was more internally focused in its deliberations and composition. The composition of the Group was restricted to people within LRI, for example senior clinicians, senior managers of the Trust including business managers, re-engineers and management

consultants. The group continued to meet until the end of the 1996 when it was decided that the newly constituted hospital executive would address future issues related to the change agenda of the hospital.

The Re-engineering Team Leaders Review was established in February 1995. The group consisted of senior re-engineers, for instance, the Re-engineering Programme Leader and Re-engineering Laboratory Team Leaders, meeting together and occasionally with senior managers and directors of the Trust to discuss issues and concerns related to re-engineering. This forum provided a more informal opportunity to consider the work of different re-engineering laboratories. The group dissolved late in 1995 as the re-engineering laboratories were dissolved.

### Re-engineering Laboratories

Re-engineering laboratories were 'physical facilities' accommodating teams of re-engineers working on the development and implementation of concepts for redesigning patient processes. The laboratories were designed to remove team members from their existing working environment and encourage them to *"take a fresh look at the way the work gets done in the areas from which they came"* (The Leicester Royal Infirmary NHS Trust, July 1994a:16). The creation of the laboratories indicated that the task of re-engineering was being organised using specially created change management teams whose members were mostly seconded full-time into re-engineering teams and able to concentrate on re-engineering without their usual operational responsibilities. External management consultants, working within each laboratory supported the change teams from within the hospital.

In practice, over the period of the re-engineering programme there were two generations of re-engineering laboratories formed to redesign the core processes discussed above. Between July 1994 and January 1995, three re-engineering laboratories were formed to focus upon the core processes of patient 'visit' and patient 'test'. The laboratories were called the 'Patient Test Re-engineering Laboratory', 'The 20 Minute Wait Re-engineering Laboratory' and the 'Patient Visit Re-engineering Laboratory'. In addition to the programme leader and a management consultant, approximately six people were seconded from existing roles within the Trust to work full-time in each laboratory. The individuals came from a range of administrative and clinical backgrounds. At March 1995, four new re-engineering laboratories replaced the three re-engineering laboratories. Numerically, the composition of each laboratory was greater than previously, involving a total of 28 individuals seconded from their posts. Each laboratory had a team leader, and the leaders met as a group once a fortnight in a 'team leaders review meeting'. The four new re-engineering laboratories were created to support the redesign of four newly identified core processes of 'emergency entry', 'patient stay', 'patient visit', and 'clinical support services'. The laboratories were located on former wards on one level of a wing of the hospital. Members of laboratories were told by senior managers that they had been selected as re-engineers because they were the 'brightest and the best' in the organisation and that they 'will [over the period of re-engineering] open the door of the hospital to the future'. The laboratories continued in existence until the decision in September 1995 to shift formal responsibility and accountability for re-engineering to the clinical directorates. Following this decision, the occupants of the laboratories dispersed; some left LRI for other posts, others returned to their former roles, whilst some were appointed to senior process management roles within the directorates. By February 1996 the number of full-time re-engineers had reduced to single figures located in a newly developed unit called the 'centre for best practice'.

## Management consultants

Two firms of management consultants have contributed to the re-engineering programme at LRI. Prior to appointing the firms the Trust met with over 25 organisations offering consultancy support. In the 'programme initiation document' published in January 1994, management consultant advice and expertise was reported to be a pre-requisite for the programme (Leicester Royal Infirmary, 1994). LRI sought consultant partners to: provide a methodological framework for re-engineering and redesign; to assist the laboratories in improving core business processes; provide executive level coaching and strategic guidance and assess IT infrastructure and needs. In the tender document issued by LRI, criteria for selecting consultants included:

- Demonstrable experience of supporting successful re-engineering projects in organisations with £100 million turnover;
- Willingness to share risk;
- Ability to support re-engineering laboratories;
- An approach which incorporates a timescale for the total project of two years or less;
- An ability to develop performance measurement models which link service quality with cost, case-mix adjusted activity and clinical effectiveness factors.

Despite this last criterion there was no mention of previous experience of consultancy support in the healthcare sector amongst the criteria.

The first group of consultants within LRI acted for three months between May and July 1994, and worked on a Scoping study of re-engineering within LRI. Three individuals, providing a level of support of two whole time equivalents, worked as members of the Scoping team alongside eight senior doctors, nurses and administrators from within LRI. In the context of the whole programme the work of the Scoping team was important and shaped much of the ambition and methodology used throughout the re-engineering programme.

A second consultancy firm joined the programme in August 1994. This firm had not acquired its experience of re-engineering in UK healthcare. The cost of the consultancy support is reputed to have taken a significant proportion of the loan from the NHS Executive. The consultants joined LRI at the inception of the re-engineering laboratories and redesigning of visit and stay processes. With consultants attached to each laboratory, key elements of the consultancy input were facilitating the redesign of patient processes through the transfer of knowledge, analytical models and techniques for redesigning patient processes.

## Process Re-engineering at the LRI

What evidence is there of process redesign within LRI?

Change and process redesign

In order to establish that the performance of the LRI had been dramatically transformed as a *result of* the redesign of core patient care processes, it would be necessary to demonstrate:

- First, that redesigned care processes have been implemented across the majority of the hospital;
- Then, that the performance of the hospital has improved dramatically in respect of the quantity, quality and cost effectiveness of care.

This section examines process redesign at the LRI in more detail.

Patient process redesign

Re-engineering at the LRI has primarily been directed at re-designing patient care processes. To varying degrees, emergency services, elective in-patient surgery and out-patient services have all been subject to redesign. The main examples of patient process redesign are identified below.

*The 'effective clinic'*. The concept of the 'effective clinic' has been developed and rolled-out throughout the hospital. This concept was developed early in the re-engineering programme at LRI. Two re-engineering laboratories, 'Patients Visit' and '20 minute-wait' were used to develop and promote the concept of the effective clinic within LRI. The effective clinic concept has changed the organisation and functioning of many out-patient clinics in LRI by: reducing 'hand-offs' within clinic processes; creating clinic teams; creating the role of clinic co-ordinator which combines a number of clerical functions within one role; better scheduling patient attendance at clinic. LRI reported that by January 1995 over 100 outpatient clinics had been redesigned, spanning Surgery, Medicine, Gynaecology, Obstetrics, Orthopaedics Oncology and Paediatrics.

*The 'single visit clinic'*. Based largely upon the original Sigma Project's Neurology clinic, similar clinics have been established in a number of specialties, including Rheumatology, Gastroenterology, Cardiovascular Medicine and Gynaecology. Detailed studies in Gastroenterology and the Gynaecology reveal how re-engineering personnel and methodologies have contributed to the practice of the concepts of the effective clinic and the single visit clinic. Both these cases reveal segmentation and redesign of services for discrete groups of patients within out-patient settings.

### Case study: Re-engineering out-patients services in the specialty of Gastroenterology

Re-engineering resources and ideas have been used within the specialty of Gastroenterology to support the introduction of a single visit clinic. 'Baselining' analysis of patient activity identified that certain procedures such as upper GI endoscopy and flexible sigmoidoscopy could be seen as relatively routine and low risk. Some experienced nurses developed into nurse endoscopists practising to clinical guidelines with consultant support available if required. Substantial change was achieved to this visit process within six months of project initiation. Elective patients now come into a redesigned out-patients clinic, receive an initial consultation, undergo nurse-led endoscopy, subject to clinical protocol, are recovered and receive their diagnosis in one day. The introduction of a single visit clinic reduced the number of visits for 66% of patients from 3 to 1. The creation of a single visit clinic contributed to substantial increases in patient throughput, reduced waiting times for patients and high levels of expressed patient satisfaction.

### Case study: Re-engineering out-patient services in the specialty of Gynaecology

The creation of the Menstrual Clinic represents a fusion of ideas about re-engineering and evidence-based medicine. Early clinical audit data in LRI suggested that 30% of gynaecological out-patients presented with menstrual disorders. These women were being treated in general gynaecology clinics with different treatment regimes according to the consultant. The Menstrual Clinic in part arose out of a view which suggested that this was an important patient grouping that merited a response in terms of designing new services. The clinic has been operated by two consultants since March 1996. In keeping with the philosophy of re-engineering the creation of a menstrual clinic has involved changes to the process of care for patients with menstrual problems. Clinic co-ordinators screen referral letters from GP's according to protocols and appointments are made for the clinic. Pre-assessment documentation is sent out to the patient. In line with the aim of the clinic being to significantly reduce waiting time to diagnosis and agree a plan of treatment, all tests are taken during the clinic visit to reach diagnosis. Diagnosis and treatment options are discussed under agreed protocols. Pre-developed medical and surgical guidelines are used to agree the choice of treatment. Internal documentation suggests that surgical procedures are to be offered only if necessary criteria are fulfilled. The two consultants who operate the clinic debrief and audit each other's practice at the end of the clinic. The menstrual clinic remains operational. The changes in service delivered deviated from the initial plan, with a mixed picture of achievement. There have been some problems 'rolling-out' the menstrual clinic amongst wider numbers of Gynaecology consultants within LRI. At the final point of data collection in March 1998 only the two original sponsoring consultants were actually operating a menstrual clinic. It is reported that a further two consultants will operate a menstrual clinic from October 1998. The difficulties of roll-out are interesting given that standardisation of the care process for patients with menstrual problems, according to clinical protocol, is fundamental to the spirit and purpose of the menstrual clinic. On the issues of diffusion of clinical practice, the case of the menstrual clinic is characterised by consultant gynaecologists emphasising retention of clinical autonomy and control over practice in the face of arguments about standardisation and protocol-driven medicine. Managers, re-engineering and even clinical leaders may endeavour to shape and influence clinical behaviour but they cannot readily enforce change in clinical practice.

*The 'Balmoral Test Centre'. and Clinical Support Services.* The practice of the effective clinic concept and single visit concept have benefited from redesign of clinical support services, such as Radiology, Pathology, and Pharmacy and the development of new clinical support facilities such as the Balmoral Test Centre. Located next to the hospital's

major outpatient clinics, this Centre was created to perform multiple test functions, such as simple blood analysis, ECG, and basic radiology. This is an example of 'near patient testing'.

'Process analysis' have also been employed within the clinical support services of Pathology, Radiology and Pharmacy. The process of redesigning Radiology services is based on a conceptualisation of the service in terms of processes of 'entry', 'attendance' and 'exit'. Examples of changes to processes of accessing radiology services and reporting radiology results include: nurses in the A&E department and on Orthopaedic wards now requesting x-rays subject to protocol; GP's accessing ultrasound services from their practice; rescheduling of CT and MRI scans to create a better balance of access between emergency and elective demand; the creation of an ultrasound clinic to better manage emergency and elective demands on the service. Pathology services have also been redesigned. Progress towards actually implementing the redesign varies across the disciplines within Pathology. In Histopathology, progress has been made reducing the time to analyse and report tests from days to hours. These improvements have greatly contributed to development of the effective clinic and single visit concepts into practice, for example, the creation of the menstrual clinic and single visit endoscopy clinic.

It has been reported to us by LRI that process-redesign of pharmacy services, including the development a new roles of near-patient pharmacist and 'clinical distributor', has led to greater contact between patient and pharmacist, more medication counselling for patients, quicker patient discharge, higher compliance with medicines code, rationalisation of drug use, and greater utilisation of patients' own medicine. Whilst acknowledging these reports the focus of our work prevents us from being able to verify or contradict these reports.

*'Patient assessment processes and facilities'*. Re-engineering added momentum to the development of assessment units on entry to LRI. A Medical Assessment Unit predated the re-engineering programme within LRI. However, the work of the emergency entry laboratory, and more recently process managers within the directorates of Medicine and A&E & Orthopaedic Trauma has focused on redesigning processes of patient access and discharge from that unit. The work of the emergency entry re-engineering laboratory extended the idea of an assessment unit to create a Surgical Assessment Unit. More recently, a Children's Assessment Unit has also been created to improve the processes on entry and admission to LRI for children. Change has also been made to service provision for patients attending the A&E department with minor injuries.

Case study: Re-engineering the process of care for patients attending the A&E department with minor injuries

Leicester Royal Infirmary Accident and Emergency department is one of the largest departments of its kind in the UK. A&E attendance's have increased throughout the 1990's in line with national trends. Nearly 110,000 patients were seen in the A&E department during 1996. Accompanying increased patient demand, the patients charter has increased pressure for demonstrable improvements in the quality of the service provided. Re-engineers attempted to improve waiting times for patients in A&E by re-engineering the process of care for patients attending A&E with minor injuries. Patients with minor injuries are a large majority in the total number of patients who attend A&E each year. Redesign of the care process for patients with minor injuries included nurses at triage ordering x-rays and providing minor treatments for a restricted set of injuries subject to clinical protocol. Full implementation of a redesigned process has proven difficult. In formal terms the re-engineering of patient processes within A&E commenced during the summer of 1995. Data covering the period from 1995 to 1997 show that despite changes to the patient process there is a considerable shortfall between the waiting time targets

set by re-engineers in 1995 and actual waiting times in A&E. There is no evidence that changes to the process of care for patients with minor injuries have reduced overall waiting times in A&E.

*'Care pathways and protocols'*. Many of the specific interventions within the re-engineering programme at LRI embody the idea of segmenting and redesigning services for clinically discreet groups of patients, both within outpatient and inpatient settings. These initiatives frequently incorporate the use of care pathways or clinical protocols. Notable examples include redesign of the care process for patients admitted with musculo-skeletal injuries including a fractured neck of femur; patients admitted for elective ENT surgery; and patients admitted for elective Gynaecology surgery.

#### Case study: Re-engineering elective surgery within the specialty of ENT

ENT is an important surgical specialty accounting for nearly 30% of the hospital's elective workload. LRI is the only hospital in the locality providing an ENT service. The recent history of the ENT service is characterised by long waiting lists and purchasers trying to increase the level of contracted activity. Re-engineers and management consultants were keen to reduce the length of patient stay in hospital, and increase the activity of the specialty by redesigning the process of care for patients requiring routine elective procedures such as tonsillectomies and septoplasties. This intervention was the first attempt within the LRI re-engineering programme at re-engineering the process by which patients are admitted into the hospital for elective surgery and require a period of stay in hospital. Re-engineers also hoped that the patient process developed for ENT would offer a template of a re-engineered routine elective surgical service that could be used to 'roll-out' re-engineering across surgical specialties.

Re-engineering of the elective process of care commenced during Summer 1995. Implementing the 'vision' of a re-engineering process was controversial and took far longer and involved more managerial effort than first anticipated. Judgement of whether this intervention in ENT has been successful is ambiguous. The ENT project did eventually succeed in defining and implementing substantial changes to the patient process experienced by substantial groups of elective patients. Some of the 'quality' targets set by re-engineers have been achieved. The redesign of the patient process has contributed to a significantly shorter length of stay for patients. 98% of patients requiring routine elective surgery are admitted into hospital on the day of surgery. ENT has made improvements in its activity and waiting times have been improved compared to the period prior to re-engineering. However the ambitious activity targets set by re-engineering are far from being achieved. The pace of work, as measured by patients per operating list, is largely unchanged compared with the period before re-engineering.

#### Case study: Re-engineering elective surgery within the specialty of Gynaecology

Within Gynaecology elective services account for 60% of all admissions so the elective re-engineering project covers a major stream of activity. Similar to the ENT intervention discussed above the in-patient intervention was designed to re-engineer the process by which gynaecology patients are admitted for surgery, discharged from hospital and cared for at home after elective surgery. The key formal objective of the intervention was to reduce length of patient stay in hospital accelerating the pace of established clinical, nursing and administrative changes and ambitions with the directorate. The intervention has been successful in a number of respects. The re-engineering care process has been adopted by nurses and doctors and is now an 'embedded' feature of the work process in the specialty of gynaecology. Six months after the pilot of the new care process by two consultants, the new process had been adopted by all the gynaecology consultants. The key features of the re-engineered care process such as pre-clerking, admission on the day of surgery, quicker discharge after operation and



follow-up care at home by a nurse have been adopted by consultants and their nursing teams. The level of clinical support for the re-engineered process has been a critical factor in the sustainability of the new care process and its extension to a greater number of gynaecological procedures; reductions in the length of patient stay in hospital, more efficient utilisation of hospital resources and reported improvements in the satisfaction of patients and staff with the service.

Case study: re-engineering the process of care for patients admitted with a fractured neck of femur.

Specific objectives relating to re-engineering the care process for patients with a fractured neck of femur were to improve the quality of care by quicker referral of the patient to an orthopaedic specialist and reduced length of stay in line with 'best practice' guidelines. In formal terms the re-engineering of the process of care for patients admitted with a fractured neck of femur commenced during the Summer of 1995 and the process of change continues. Data since 1995 reveal that significant changes have been made to the process of care for patients. Some improvement has been made in the speed at which patients are investigated in A & E, and operated upon. Improvements have not, however, been made in the overall length of patient stay in hospital. However, improvements fall short of both targets set by re-engineers during 1995 and national best practice regarding length of patient stay in hospital.

## Redesign of organisation and management

Re-engineering has had some impact on organisational form, roles and hierarchy. Directorates and specialties have survived as forms of organisation within LRI with no significant reconfiguration of the pattern of directorates and specialties that existed before re-engineer. However, there is evidence of a number of changes of a structural and process nature in and around the directorates. The purpose and rationale of changes are closely connected with the spirit of re-engineering. The changes are discussed below.

*Service organisation and roles:* At service delivery levels there are changes to organisation and staffing. Re-engineering encouraged greater multi-professional and team-based approaches to patient care. On Orthopaedic wards the concept of ward management has been replaced by team-based nursing. Whilst team-based nursing is not a re-engineering idea *per se*, its adoption within the specialty of orthopaedics has been shaped by a re-engineering process which saw a reconfiguration of Orthopaedic wards and the redesign of the care for patients with patients admitted within musculo-skeletal injuries, including those with a fractured neck of femur, (discussed as a case study earlier in this report). Within a framework of process management the A&E department has been reorganised into six clinical teams, each under the leadership of a clinical manager and a lead clinician. Within the Medical Directorate, specialty process teams have been created.

New roles have been developed within LRI as part of the redesign of patient processes. In Gastroenterology there is now nurse-led endoscopy. Selected nurses in Gynaecology discharge patients and provide follow-up care of the patient at the patient's home after operation. Some nurses in A&E are now trained to order a limited number of x-rays and apply minor treatments at triage. There have also been changes in support worker roles. The concept of the effective clinic involved the introduction of the role of clinic co-ordinator within out-patient departments across LRI. The new role of 'clinic co-ordinator' was created across the Trust to improve the efficiency of clerical support within clinics. The role of clinic co-ordinator role is an exercise in multi-skilling as it combines a number of clerical roles within clinics within a single role. Evidence suggests that the role of clinic co-

ordinator is now part of the organisation and management of out-patient services within the vast majority of specialties within LRI. More detailed evidence has been collected about the role in practice in the specialties of Gastroenterology and Gynaecology. In these cases, the role of clinic co-ordinator is broader in both concept and practice than the previous clinic clerk role and is leading to more proactive management of waiting lists and a better operational management capability within clinics. Clinic co-ordinators are important players in the redesigned patient processes offered within these out-patient clinics. In ENT and Gastroenterology, the new role of 'team-associate' within the patient process has been developed, aided by competency-based training and education processes. In ENT, the 'team associate' role is one of a multi-skilled porter whom books patients in on arrival at hospital, helps the ward clerk and transports the patient between the operating theatre and ward after operation.

*Process management.* In keeping with the spirit of re-engineering 'process management' has been introduced at the clinical directorate and clinical specialty levels of management. First introduced in late 1995 in the directorate of A&E & Orthopaedic Trauma, process management was extended across all directorates and specialties within the Trust during 1996 and 1997. Re-engineering revealed the patient process to be a key level of organisational activity. Process management is an attempt to strengthen managerial accountability and responsibility for patient processes at specialty and directorate levels. It is also an attempt to improve managerial communication and decision-making across specialties and directorates. It is embodied in a set of new roles at these levels based on a clinical director working with a patient process director within each directorate. Other key roles are those of process manager, responsible to a process director, and Head of Service. Process management has replaced 'functional management' roles at directorate level based upon the following triumvirate of roles: clinical director, business manager and senior nurse. Our detailed studies in Orthopaedics, Gastroenterology, ENT, Gynaecology and the Medical Directorate reveal process directors and managers making a major contribution to patient process redesign. There is also evidence to suggest that process directors and managers from different directorates and specialties are working together to improve joint-directorate working and the flow of patient processes that cross directorates and specialties. Process managers in the surgical directorate now meet regularly with representatives of operating theatres to evaluate and plan the utilisation of theatre resources. Managers within the A&E department are working more closely with those in the Medical Directorate to improve the functioning of assessment units and manage the flow of emergency patients through the hospital. At an operational level, a group of process managers drawn from a range of specialties and directorates now meets on a regular basis to address issues around the processes of entry, admission, and discharge of emergency patients. Within Orthopaedics, the 'Process Link Group' was formed in 1996. The group is a multi-professional group that meets on a weekly basis to analyse and improve the care process for Orthopaedic patients. Chaired by a process manager within Orthopaedics, meetings of the Process Link Group involve representatives of the A&E department and Operating Theatres as well as clinicians in the specialty of Orthopaedics.

*Hospital Leadership:* There is evidence of both continuity and change in the leadership of the hospital. Occupants of key senior management positions within the Trust such as Chairman, Chief Executive, Medical Director, Directors of Finance, Nursing and Human Resources, and the Re-engineering Programme Leader were unchanged over the period of the evaluation. However, in the period there has been considerable turnover of the majority of clinical directors and many clinical heads of service. Alongside, the cadre of newly appointed process directors and process managers these personnel changes represent a complete turnover of senior managerial and clinical personnel within the hospital. Whilst turnover is not necessarily attributable to re-engineering, selection

decisions relating to recent senior appointments have been influenced by re-engineering. Senior managers and clinicians instrumental in processes of appointment suggest that the re-engineering intervention contributed to their developing a different view of the leadership required by LRI. They believe that this alternative view of leadership has influenced processes of replacement, recruitment and succession at clinical director, head of service and the former business manager levels. During 1997 the purpose and composition of some of the highest level decision-making forums, such as the Hospital Executive were reconstituted to improve managerial and clinical interaction within strategic and operational decision-processes.

*Management Education and Development:* Processes of educational, training and management development have also changed. Notably, a leadership development programme has been developed to accompany the recent changes in personnel and roles at senior levels of the organisation. The programme is directed at the top strata of managers from clinical and managerial backgrounds, for instance, clinical directors, executive directors, process directors, process managers and heads of service. The programme lasts for 3-days and is attended by approximately 20 people at any one time. By August 1997, 72 individuals had attended the programme. Plans are in place to open the programme up to individuals within the LRI aspiring to these roles. A feature of the programme is the attempt to broaden individuals' perspective about other personnel, processes and activities within the hospital. The hospital's Centre for Best Practice also provides training and education in patient process redesign.

*Supplies* is an example of a non-clinical service which has been re-engineered with resulting major cost savings.

LRI: changed but not transformed

A dominant theme within writing about business process re-engineering is the intention to shift from incremental to radical or even transformatory levels of change, delivering 'breakthrough' levels of efficiency improvement not just in one functional department but across the whole organisation. The practice of transformational change has been defined by Ferlie, Ashburner, Fitzgerald and Pettigrew's<sup>49</sup> (1996) as involving the following:

- the existence of multiple and interrelated changes across the system as a whole;
- the creation of new organisational forms at a collective level;
- the development of multi layered changes which impact below the whole system, at unit and individual level;
- the creation of changes in the services provided, and in the mode of delivery;
- the reconfiguration of power relations (especially the formation of new leadership groups);
- the development of a new culture, ideology and organisational meaning.

Similarly, Greenwood and Hinings (1996:1024) argue that revolutionary and evolutionary change are defined by the scale and pace of upheaval and adjustment. Whereas evolutionary change occurs slowly and gradually, revolutionary change happens swiftly and affects all parts of the organisation simultaneously.

Reflecting on evidence of process redesign within LRI up to March 1998, we are doubtful that these changes constitute evidence of organisational transformation. There is insufficient evidence of interconnected and coherent process redesign across LRI as a healthcare system. Relatedly, the numbers of patients who experience a redesigned service are uncertain. Process management and ongoing attention to process redesign is occurring within the framework of clinical specialties and clinical directorates. Process management and process redesign are therefore framed and constrained by an organisational form that reinforces values of clinical specialisation and work differentiation. Process redesign has not fundamentally affected either the clinical practice, roles or routines of doctors.

Whilst re-engineering may have touched several types of patient service within LRI, we are doubtful that the majority of patients of LRI experience redesigned healthcare processes, especially those admitted to LRI either as emergency or elective patients. Over the period of the evaluation, we have observed the adoption and impact of re-engineering to vary enormously across clinical specialties and directorates within LRI. Obstetrics and Gynaecology is one directorate where re-engineering resources and ideas have contributed to service change for a relatively large number of patients, both in-patients and out-patients. By comparison the use of re-engineering resources and related ideas is much more limited in some other directorates and specialties and hence confined to smaller numbers of patients. The specialties and services within the medical directorate display vastly differing rates of adoption and impact of re-engineering.

By contrast with the all-encompassing ambition at the outset of the re-engineering intervention, changes to patient processes look rather patchy and uneven across specialties and groups of patients. Furthermore, it is difficult to relate a lot of the change activity that has occurred to generic core processes identified at earlier stages of the intervention. As individuals within clinical specialties deliver patient processes a great deal of patient process re-engineering has been concentrated on particular patient groups within particular clinical specialties. The mobilisation of process redesign has tended to follow imperatives at the levels of a particular patient group, clinical directorate, clinical specialty or even medical consultant rather than some overarching logic associated with predefined sets of core processes. A consequence is that the process of re-engineering, and many of the effects, are confined to particular patient groups, particular clinical specialties or even particular medical consultants. The considerable variation in the rate and pace of re-engineering across the clinical specialties and directorates of LRI is both a product and process of a limited realisation of re-engineering ambition to make changes in generic processes that cross specialty and directorate boundaries. A principle of re-engineering is that changes need to be made at the work interfaces. However a feature of the re-engineering intervention within LRI, especially in relation to care processes relating to emergency and elective care processes for those admitted to LRI, is that making change across the interfaces of existing specialties and clinical directorates has proven to be a slow and difficult process.

In performance terms, the considerable variation in the rate and pace of re-engineering across clinical specialties and directorates of LRI has contributed to the impact of the process redesign in one part of the LRI healthcare system being reduced by a lack of change in another part of the hospital. This is a general weakness of the impact of re-engineering within LRI. The case studies of the care process for patients admitted for ENT surgery and with a fractured neck of femur are illustrative of this problem. The effects of redesigning the care of orthopaedic patients is perceived to be regulated and limited by a lack of change in some other aspect of the care process, for instance, A&E services and Social Services. Effects of changes to the care process for patients attending A&E with minor injuries have been minimised by other aspects of the care process within the A&E

department that have not been redesigned. Whilst services such as Pathology and Radiology have been redesigned and have potential to impact of processes that flow across the hospital, senior managers and clinicians in both Radiology and Pathology remain sanguine about the magnitude of changes to these services. There remains a large gap between 'theories' and 'visions' of re-engineered radiology and pathology services and current practice. They also question whether the mechanisms and processes are in place at specialty level to exploit changes and improvements made to these services. The creation of the Menstrual Clinic is one example of improvements in histology facilitating the design and practice of a new clinic. It has been reported from clinicians within the medical directorate that the re-engineering of pharmacy has had a positive impact on some medical services. However, as we have not studied changes made to Pharmacy services, we cannot confirm or deny such reports.

It would be unreasonable and misleading to suggest re-engineering has simply created a collection of low-level, discrete, incoherent projects. Some re-engineering initiatives do transcend directorate and specialties levels of organisation and have a more generic application within LRI. The effective clinic represents a re-engineering initiative with an implementation that is trust-wide. The testing facility called the Balmoral Test Centre has a utility accessed by a number of specialties. The redesign of clinical support services such as Pathology, Radiology and Pharmacy, for example, have implications for large numbers of patients receiving treatment across a wide range of specialties. However, the re-engineering programme within LRI has experienced difficulty in creating through process redesign, multiple, interconnected changes across LRI as a healthcare system. Developing greater coherence of process redesign across specialties directorates is a major feature of ongoing process redesign work within LRI. Ongoing attempts to redesign processes of emergency and elective care that cross specialties and directorates within LRI are discussed in more detail in the next section titled ongoing redesign and future change in LRI.

It has been observed above that re-engineering has also had an impact on structural features within LRI such as roles and hierarchical groupings. Whilst it was never articulated by senior management that a restructuring of directorates was a pre-requisite for re-engineering, proposals by the chief executive in 1996, to reconfigure clinical directorates within LRI did not materialise. The configuration of clinical directorates and clinical specialties that existed prior to re-engineering is largely undisturbed. Directorates have survived as a basic form of organisation within LRI. Indeed, not only have directorates and specialties survived, they have considerably shaped, the process and impact of service redesign in LRI. One may interpret the adaptation of the re-engineering methodology to suit the circumstances of directorates as a sign of a robust and successful defence at directorate and speciality levels of organisation, of values that re-engineering purports to challenge: namely clinical work specialisation and differentiation.

The devolution of responsibility for re-engineering to managers at these levels further embedded the capability of these levels to address change on their own terms. So long as process management and ongoing attention to process redesign is occurring within the framework of clinical specialties and clinical directorates, process redesign runs the risk of continuing to be framed and constrained by clinical specialisation and work differentiation. Such conditions seemingly enhance the possibility for incoherence and interconnectedness within patient processes that flow across specialties and directorates of the hospital.

In patient care processes, there is a spectrum of decision making from the purely managerial or administrative (e.g. clerical procedures) on the one hand to the purely clinical on the other (e.g. decisions about therapeutic policy). At the LRI, whilst process

redesign has frequently been operating at the interface of clinical and managerial concern and influence, it has rarely engaged directly with the ambition of changing clinical practice. In general, re-engineering has been an exercise in organisation and management practice rather than clinical practice. Whilst not trivialising service changes attempted and effected as part of the re-engineering programme, the creation of the menstrual clinic is unique amongst the re-engineering interventions in LRI, being the project which seeks to most directly address issues of clinical effectiveness and change clinical practice. All other patient process interventions reported here are concerned with the organisation of patient care process rather than the actual clinical intervention. It remains to be seen whether the menstrual clinic is an isolated example within LRI of linkage between the agendas of re-engineering, clinical audit and clinical effectiveness. Some examples of process redesign such as those in Gastroenterology, elective Gynaecology and Orthopaedics reveal extended roles for nurses subject to clinical protocol. However, on the whole this programme of intended transformation has left much clinical practice undisturbed with only little change in the power and influence of doctors on clinical practice.

### Ongoing redesign and future change in LRI?

As the BPR programme reached the end of its formal plan in the middle of 1996, it was generally accepted that the initiative had not been completed. Prompted by LRI, by Summer 1997 it was agreed that a further research question had emerged - was the capacity of the LRI to undertake further change in the future increased by the BPR programme? Again quoting an LRI document<sup>47</sup>:

"As important as the tangible improvements in performance has been the development of capacity for on-going change and continuous improvement at The Leicester Royal Infirmary." LRI, 1997

What about further effects of re-engineering in the future? There is a known problem of 'temporal-lag' in evaluations of this kind<sup>11</sup>. The straightforward testing of the relationship between an intervention and organisational outcomes is prone to methodological difficulties and it is important to assess change in 'process criteria' as well as 'outcome criteria' in evaluations of this kind. The hypothesis being that improvements in the performance capability of the organisation and individuals will lead to global and economic measures of organisational effectiveness in the longer-run. Evidence about ongoing process redesign, continued motivation to change and learning about how to manage change suggests that we cannot rule out further change within LRI after this evaluation is complete.

New educational processes, such as the leadership development programme now bring clinicians and managers together to address change from the perspective of the whole hospital. In terms of support amongst clinical leaders with LRI at operational and strategic levels LRI is better conditioned now for process redesign that it was in previous times. There is evidence of a new cadre of organisational leaders, both clinical and managerial, seemingly more open and prepared for process-based change than perhaps their predecessors in 1994 and 1995.

Empirical work in late 1997/early 1998 interviewing the majority of clinical directors, business managers and heads of services across LRI about the impact of re-engineering revealed some cynicism about the tangible effects of re-engineering to date. However, permeating the above views on a consistent basis is the argument that re-engineering continues to be a catalyst for change. The catalytic qualities of re-engineering relate to

perceptions that re-engineering has encouraged people to think about change, provided energy and momentum for change, legitimised change and created an environment to try and change practices. Whilst overt manifestations of re-engineering such as: the laboratories, re-engineering committees, management consultants and culturally-alien language of 'baselining', 're-engineering', 'roll-out' are now viewed cynically within LRI, the idea of change through process redesign is enduring.

"the word re-engineering turned people off but the principle of looking at what you do and better ways of organising is a good one. It has led people to question" (Consultant, September 1997)

In practice many of those process innovations studied in detail continue to develop. For example, the work in the specialty of Orthopaedics redesigning processes of care for musculo-skeletal patients is an ongoing process with strong clinical and managerial support. As the researchers left the site two more consultants were reported to be developing menstrual clinics.

Newer change initiatives and ideas are developing alongside these older more established process interventions. There are signs that LRI has learned from the experience of the past few years and is trying to develop an approach to process redesign that is more coherent across specialty and directorate boundaries.

Some of the most notable ongoing patient process redesign work relates to a more clear demarcation between 'emergency' and 'elective' care processes. The care of patients admitted as emergencies represent a large and increasing component of the total work of the LRI. Some of the early work of the emergency entry laboratory and some recent work within the Medical Directorate exposed problems for the hospital related to the process of emergency admission. Work is ongoing to better manage processes by which increasing numbers of emergency patients are admitted, treated and discharged. Standard re-engineering methodologies such as 'process mapping' are being used by clinical and managerial representatives from a range of specialties and directorates to better understand the increasing demands that 'emergency patients' make on the hospital at different times of the year, and how demands may be best met. Both early work of the emergency entry laboratory about the 'flow' and 'placement' of emergency patients around the hospital and the operation of assessment units are contributing to an emerging corporate strategy and approach for managing emergency care within LRI.

Learning from the process and effects of some of the earlier attempts at process redesign is now being used to take a more corporate-wide view at Hospital Executive level of the approach to the provision of elective care. Improved testing processes, and the spread of pre-operative assessment practices (discussed in detail in the cases of re-engineering elective surgery in ENT and Gynaecology) are contributing to changing practices of admission into hospital for elective surgery.

The period of the re-engineering exposed a highly contentious relationship between the area known as operating theatres and surgical specialties. Problems emerged about: the availability of operating theatres, the locus of control of operating theatres; and the transportation and flow of patients between theatres and the wards before and after operation. In 1997, problems were exacerbated by budget overspends in theatres.

Though surgical services and operating theatres are managed through different clinical directorates attempts are being made to improve the interface between surgical specialties

and operating theatres. There appears to have been a marked improvement in the utilisation of operating theatres in recent years. Information about the utilisation of operating theatres is now more widely disseminated between theatres and surgical specialties than was previously the case. The introduction of a process management structure across surgical specialties during 1996 and 1997, alongside changes in the internal organisation and management of theatres is contributing to ongoing attempts to improve patient processes between surgical specialties and operating theatres. Since November 1997, managerial responsibility for surgical services and theatres processes has rested within the remit of the Surgical Process Director. Operationally, process managers from a range of surgical specialties now meet representatives from operating theatres on a weekly basis to look at the utilisation of operating theatre time and plan operating lists.

Learning from earlier innovations that started at specialty and directorate level is being transferred and proving useful to ongoing momentum for patient process redesign within LRI, the implications of which transcend particular specialties and directorates. For example, within the specialty of Orthopaedics new processes have developed related to the discharge of patients and development of collaborative notes amongst carers on the wards. Learning from these initiatives is being discussed in forums outside of Orthopaedics for possible wider implementation within the Trust.



## The Impact of Re-engineering on Hospital Performance

The purpose of the LRI re-engineering programme was to achieve dramatic improvements in hospital performance. Furthermore, the original anticipated pace of change was such that re-engineering would generate dramatic performance transformation in a timescale of less than two years. Has re-engineering led to a dramatic improvement in the performance of LRI?

### LRI's evolving objectives

Improving quality has been a consistent objective of the re-engineering programme at the LRI. Initially, however, there were also ambitious aims to reduce costs. However, as the difficulty of identifying and realising financial savings became clear, the emphasis shifted towards improving the hospital's utilisation of real resources (e.g. hospital beds, operating theatres, staff time etc.) to make it easier for the hospital to cope with the changing demand for care in the future. It is possible that process redesign was improving the utilisation of real resources, but this improvement was not always of sufficient magnitude to allow the loss of entire staff posts or the closure of beds.

### Assessing hospital performance

Although something of a simplification, the performance of an individual hospital can be assessed on three dimensions: the *volume* of care delivered; the *quality* of care delivered; cost and *efficiency*. The evaluation has used several different methodologies to assess the performance changes at LRI. Some have involved collection of primary data from case notes etc. in specific case studies. Other dimensions have been measured using routine NHS statistics which allow comparison with other hospitals over the time period.

### Using routine NHS statistics

The research undertaken examines the evidence that the LRI has made significant progress along volume, quality and cost dimensions and attempts to answer the following questions:

1. Has LRI's efficiency improved during re-engineering?
2. What is LRI's efficiency gain relative to other similar hospitals?
3. Are "previously unachieved levels of efficiency and cost reduction" being achieved? (LRI internal evaluation, August 1997)
4. Have the (albeit limited) routine measures on service quality improved? Have they improved more quickly than elsewhere?
5. How does the routine NHS data evidence compare with LRI's own re-engineering project performance measures?

The general approach is to compare annual changes with 22 other teaching Trusts.

- 1994/5 as the 'baseline' year

- 1995/6 as 'during re-engineering'
- 1996/7 and 1997/8 as 'post re-engineering'.

Table 3: Types of performance measures

Types of output measures	
Type of measure	Rationale
Output per £	<p>These measures, including the adjusted unit labour costs, measure the overall 'efficiency' of the hospital. That is, they measure the amount of activity of output produced per £ of input. Essentially there are 4 methods taken in this first analysis:</p> <ul style="list-style-type: none"> <li>▪ Weighted activity per £ of operating costs</li> <li>▪ Weighted activity per £ staff costs (unit labour costs)</li> <li>▪ Weighted activity per staff numbers (staff productivity).</li> <li>▪ Speciality costs compared with other UK teaching hospitals</li> <li>▪ Case-mix adjusted National Reference Costs 1997/8 only</li> </ul>
Output per resource (non-financial)	<p>It is possible to disentangle what has improved (e.g. theatre bed throughput or outpatient) or where it has improved (which specialty or directorate?) using output per resource measures. These include, for example:</p> <ul style="list-style-type: none"> <li>▪ Bed throughput</li> <li>▪ Percentage bed occupancy</li> <li>▪ Cases per theatre session</li> <li>▪ Attendances per outpatient clinic</li> </ul>
Other indicators of efficiency	<p>Many of these are the traditional currency of health service hospital performance measures. They are related both conceptually and statistically to output per £ but are often measured using different and more detailed data sources. Examples include:</p> <ul style="list-style-type: none"> <li>▪ Case mix adjusted length of stay</li> <li>▪ Day case rates</li> <li>▪ Outpatient follow-up ratios</li> </ul>
Quality indicators	<p>These are an important part of LRI's approach to re-engineering because the intention has been to streamline and eliminate unnecessary processes for patients in order to speed up the time taken for patients to go through the system. These include indicators such as:</p> <ul style="list-style-type: none"> <li>▪ Waiting time for first outpatient appointment:</li> <li>▪ Time waiting in clinic</li> <li>▪ Waiting time for elective surgery</li> <li>▪ Re-admission rates</li> </ul>
Measured Resources Input	<p>In several instances it is useful to look at the growth in resources available to LRI to undertake work. This includes:</p> <ul style="list-style-type: none"> <li>▪ Available bed days</li> <li>▪ Theatre sessions</li> <li>▪ Out-patient clinics</li> <li>▪ Budgeted expenditure by department.</li> </ul>
Output Measures	<p>Activity measures (which can be examined in more detail on their own than when combined with resource measures or financial measures) include</p> <ul style="list-style-type: none"> <li>▪ Percentage of A and E patients admitted</li> <li>▪ Numbers of finished consultant episodes (FCE's)</li> <li>▪ Admissions by elective/emergency/day case/maternity.</li> <li>▪ Outpatient attendances by speciality etc.</li> </ul> <p>Detailed analysis of the trends of these activity measures is presented only where appropriate, but they are necessary as part of producing some of the higher level data and have therefore been recorded in appendices in the research reports.</p>

The use of NHS routine data in this way is useful, partly because LRI expected significant change to occur in some of these routine measures, and partly because certain of these measures of efficiency (bed throughput, waiting times, unit labour costs etc.) are considered important, both by the Department of Health and by Trusts and Health

Authorities across the country. For re-engineering to be judged a success, and to be credible to Trusts and Health Authorities elsewhere in the UK and internationally, the improvements in general levels of efficiency must be measurable. Table 3 illustrates the hierarchy of performance measures available.

### Baseline efficiency of the LRI - results from routine NHS statistics

The hospital commenced the re-engineering initiative for a number of reasons. Among the major drivers was a recognition of increasing pressure on available human and financial resources. There were also some concerns regarding aspects of performance (e.g. waiting time in outpatient clinics).

Managers did have a general perception of efficient performance in the hospital without undertaking a detailed analysis of all available routine data measures of efficiency prior to the re-engineering programme. However, it was important for the researchers to analyse the existing strengths of the hospital before re-engineering began.

The various indicators of efficiency used within the NHS (e.g. the Labour Productivity Index, Specialty Cost Returns etc.) suggest that the LRI was already a high achiever in terms of relative efficiency.

Total operating costs include all revenue costs (all staff salaries, supplies and consumables, energy costs, ongoing service contracts, management consultancy etc.). With 1994/95 as a baseline, comparison with all other acute hospitals in England showed the overall cost of running the hospital to be 14% below what would be expected, given the volume and type of clinical activity undertaken at LRI. Perhaps a more appropriate comparison is with a peer group of 22 other teaching hospitals which shows operating costs at LRI 39% lower than the average. This implies that total operating costs at LRI were £16 million cheaper than the average acute Trust and £44 million cheaper than the average teaching Trust.

Unit Labour costs focus on staff costs alone and exclude other operating costs. The NHS Executive calculate the staff cost per unit of activity output for each Trust in the country. The analysis using staff costs only shows that in 1994/5, only 2 teaching hospitals had unit labour costs lower than LRI, which was 17% below the teaching hospitals average. This suggests that the staff costs of LRI pre-re-engineering were already £14 million lower than might be expected given the volume and type of activity at the trust.

Traditional efficiency measures also show good baseline performance. Inpatient length of stay, when adjusted for case-mix, was 5% lower than a selected peer group and daycase rates were slightly higher than average. There were also areas where LRI were performing worse than the average trust, i.e. outpatient waiting time in clinic, where LRI was close to bottom of the first national performance tables.

Nevertheless the general picture is of a hospital with very good comparative performance figures, particularly in relation to unit costs.

## Impact on overall efficiency measures

### Activity output versus total operating costs

As re-engineering progressed, LRI remained considerably more efficient than the national average or the teaching hospital average and were ranked first amongst the teaching hospitals for the pre, during and first post re-engineering years. LRI also improved faster than the average. Performance was 14% better than the national average of all Trusts in 1994/5, improving to 19% better in 1996/7. Performance was substantially better than the average for teaching hospitals i.e. 39% better in 1994/5, rising to 44% better in 1996/7. This implies that total operating costs of LRI were £49 million cheaper than the average acute Trust and £55 million cheaper than the average teaching Trust by 1996/7. Although there is no comparator data available for 1997/8 the weighted activity per pound operating costs for LRI alone suggests the efficiency levels were sustained.

These calculations do not take account of case-mix.

### Unit labour costs and staff productivity

The use of Unit Labour Costs to assess efficiency again showed that LRI remained considerably more efficient than the teaching hospital average; 15% better than average in 1994/5 and ranked third, improving to 22% better in 1996/7 and ranked first. The LRI performance improved further in 1997/8 although comparator Trust information is not available for this year.

The difference between LRI efficiency and comparator teaching Trusts is greater for the total operating costs measure (44% in 1996/7) than for the staff costs only measure (22% in 1996/7). This suggests that non staff running costs for LRI were, and still are, substantially lower than the average teaching Trust. Again none of these calculations account for case-mix.

Case-mix adjusted unit labour costs calculated by the NHS Executive for 1996/7 show LRI to be 18% better than the average of teaching Trusts and ranked 5th. This compares with 22% better without the case-mix adjustment. The case-mix at LRI is slightly less complex than average; there is a high throughput of short stay ENT, obstetrics etc. while some longer stay specialties such as cardiothoracic surgery are not present. Even accounting for its slightly less complex case-mix LRI has significantly lower staff costs than the average teaching hospital.

Staff productivity (the activity output per whole time equivalent staff) increased from 21% better than the average teaching Trust and ranked second in 1994/5, to 41% better in 1996/7 and ranked first. Productivity continued to increase in 1997/8 although no comparator data is available. Although this change looks dramatic it is an indicator which probably overstates the true efficiency gain for two reasons. As evidenced later, the rises in number of consultant episodes at LRI were chiefly due to short stay and daycase specialties such as radiotherapy, obstetrics, gastroenterology and paediatrics. Secondly, LRI has seen increases in the numbers of consultant episodes per admission where, for clinical reasons, patients are transferred to another consultant and thus counted twice in the staff productivity calculation.

The average pay of all staff employed by the Trust (adjusted for market forces such as London weightings) was 0.2% higher than the average teaching hospital in 1994/5 and this changed to 8.8% by 1996/7. This suggests that the improvements in unit labour costs

seen are due to higher levels of activity i.e. staff productivity rather than reductions in staff salaries or skill mix.

#### Specialty costs

A further method of assessing overall efficiency was developed in order to take account of the specialty mix within Trusts. Including inpatient, outpatient and A&E costs this shows LRI at 8.7% cheaper than the average teaching hospital and ranked 5th in 1994/5, which improved to 20.1% cheaper in 1996/7, rank 1 and 18.8% cheaper in 1997/8 and rank 1.

In financial terms this equates to LRI specialty costs being £7 million cheaper than expected in 1994/5 rising to £19 million cheaper in 1996/7.

LRI is slightly weighted towards a short stay, lower cost per case specialty mix when compared with other teaching hospitals. This is why the efficiency of LRI is closer to average using this specialty costs measure than when using the cruder operating and unit labour cost measures above.

#### National reference costs for surgical procedures - case-mix adjusted

The NHS Executive has recently produced an index which compares the costs for each case-mix category (HRG) in the surgical dominated specialties across the country. The data is only available for 1997/8 and shows LRI to have a cost index of 99 i.e. 1% cheaper than the average Trust given its case-mix. When compared with other teaching hospitals the overall rank is 7th. Interestingly the LRI index for elective care is higher (106) whilst its relative costs for non-elective care are lower (89).

These data show LRI closer to the mainstream than the earlier indicators. There may be data quality issues - this being the first year of the national reference costs and it may be that when medical cases are included in next year's exercise the figures will change.

#### Summary

The analysis of each of these separate output per £ indicators suggests that LRI was one of the most efficient teaching hospitals in the country even before re-engineering began. Improvements continued during and indeed after the re-engineering initiative and LRI's overall efficiency measures have improved marginally faster than the average of other teaching Trusts. At this macro level it is not possible to directly attribute the efficiency improvements to re-engineering - a number of driving forces including GP fundholding, Health Authority efficiency gain targets and waiting time targets were also having influence. Nevertheless, efficiency improvements better than average have coincided with the implementation of re-engineering at LRI.

### Traditional efficiency measures

#### Bed throughput and occupancy

The number of inpatient admissions per available bed has increased significantly over the 4 years from 66 to 78. Total admissions per bed (including daycases) increased even faster, from 89 to 108. Total bed occupancy has remained broadly stable at just under 80%. Comparative data are unavailable because bed statistics are not collected nationally. It is interesting to note that the largest increases were in the first 'post re-engineering' year 1996/7. Again attribution of cause here is not possible given the many

driving forces on the system. Interpretation might be positive - the full impact of re-engineering improvements was realised in this year - or negative - the 'during re-engineering' year slowed down the rate of improvement in throughput which returned to normal afterwards.

#### Length of stay

The hospital started its re-engineering project from a position where average inpatient lengths of stay, even corrected for differences in case-mix and other effects, were already some 5% below what would be expected (CHKS).

There has been a reduction in inpatient length of stay over the four years of study - 4.25, 4.15, 3.88, 3.68. However, most of this 13% reduction is due to an increase in the numbers of inpatients recorded with zero days length of stay, i.e. radiotherapy visits. If patients with zero and fifty or more day stays are excluded the length of stay reduces 5% over the four years; 4.93, 3.87, 4.81, 4.68. Comparative data with an LRI selected group shows this 'trimmed' length of stay is 10% lower than its peers in 1997/8.

Several of the re-engineering projects specifically focused on reductions in lengths of stay, some with quite radical targets e.g. reduction from 5 to 2.2 days for elective Gynaecology process<sup>50</sup>. While some of these succeeded, the overall hospital reductions have been marginal.

#### Specialty level variation

The substantial increases in overall throughput are accounted for by increases in activity rather than bed reductions (total available beds were 1031, 1030, 1013 and 974).

Over the 4 years, the largest activity increases were in Obstetrics (+5000) Radiotherapy (+2,600), Gastroenterology (+2000) and Paediatrics (+1400) and finally General Medicine (+3,800). The first four of these specialties are dominated by short stay cases. This is an important issue because it means that the improvements in measures which count all admissions equally (such as bed throughput and unit labour costs) are slightly overstating the true underlying efficiency improvement.

Similarly the reductions in average length-of-stay for all episodes are explained by these rises in volume in the short stay specialties.

### Emergency entry

#### Activity trends

Emergency admissions to hospital have risen over the period although the rate of increases is slowing (+6.7%, +4.3% and + 1.7%). After an increase in the 'during re-engineering' year, the number of emergency admissions via A&E stabilised and it is the GP referred emergency admissions which caused the overall increase. The number of finished consultant episodes has risen faster as a consequence of higher numbers of transfers between consultants. For example the number of more FCEs per admission in general medicine has risen from 1.21 to 1.51. The increase in transfers between consultants were as a result of planned changes in the admission procedures to enable patients to be assessed and admitted more quickly.

## Quality measures

There are few routinely available indicators of the quality of emergency inpatient care. However, the LRI has contributed to a national comparative data set held by CHKS (CASPE/Healthcare Knowledge Systems). This includes a range of clinical quality indicators which can be used to assess LRIs performance in relation to a group of self-selected peers, although their validity is highly dependent on the completeness of data collection. These indicators suggest that the hospital is very much in the mainstream of performance compared with their peer group. Notably, LRI have an increasing admission rate which is higher than the CHKS peer group; 6.4% in 1997/8 against the peer average of 4.7%. These figures are provided by the hospital as the method for calculating readmission rates is disputed between LRI and CHKS but give similar conclusions to the definition provided by CHKS.

## Focus on fractured neck of femur - primary data collection

A second source of information on the process and quality of emergency care comes from our detailed study of elderly patients with fractured femur. Although there appear to be improvements in some indicators of quality (e.g. time taken to undertake an x-ray, shortened preoperative length of stay) most of the process and outcome indicators have remained relatively stable over the three years of our research.

Table 4: Key 'process' and 'outcome' indicators from study of patients with fractured neck of femur at Leicester Royal infirmary, 1995, 1996 and 1997

Indicator	Nature of change
'Process' indicators	
Time from entry to the hospital to first medical/orthopaedic assessment	No change following re-engineering
Time from first entry to hospital to pain relief and intravenous infusion	No change following re-engineering
Time to investigation and treatment in A & E	Reduction in time to x-ray, otherwise no change
Time from initial entry to hospital and arrival on orthopaedic ward	No change following re-engineering
Time from initial entry to hospital and arrival in theatre	Slight increase in proportion operated upon within first 24 hours, and reduction in mean delay
Proportion of cases operated upon in 'working' hours	No change following re-engineering
Proportion of patients treated by senior clinicians	Increased
Overall length of stay in hospital	No change following re-engineering
'Outcome' indicators	
Case fatality rates	Crude mortality rate in hospital unchanged, six-month mortality slightly increased following re-engineering
Destination on discharge	Higher proportion of cases discharged to 'usual place of residence', fewer transfers to other hospitals
Overall cost of hospital care	No change following re-engineering

The above were confirmed in part by LRI routine data on fractured neck of femur. This showed the percentage of cases with length of stay of less than 16 days hardly changed over the 5 years 1993/4 to 1997/8 (40%, 43%, 37%, 42%, 46%), despite an explicit target to reduce length of stay.

## Accident and emergency care

New attendances at A&E have decreased slightly over the years (+1%, -7%, -1%) but the proportion of A&E attendees admitted to hospital has increased (14.2%, 15.3%, 16.2%, 16.5%).

## Patient satisfaction surveys

Our three surveys of Patient Satisfaction among 'walking wounded' patients show no change in the overall level of patient satisfaction with this aspect of the service provided by the Accident and Emergency Department at the LRI. In addition, the time patients report spending in the Department has not improved (i.e. not reduced). In contrast, patient satisfaction levels and waiting times have deteriorated at both of the comparator hospitals, though they still remain 'better' than reported at the LRI.

## Percentage of patients assessed immediately

The Patients' Charter indicator "percentage of attendances assessed immediately on arrival in A&E" improved substantially in the year pre re-engineering, from 82% to 92%, and has been stable for 3 years at 95%. Comparator data is no longer routinely available.

The routine indicators available and our own primary data collection show several marginal improvements over the years but do not suggest a radical transformation of the efficiency or effectiveness of emergency care.

## Patient stay

### Elective inpatient activity trends

Elective inpatient workload has been stable since a 5% drop in the 'during re-engineering' year (16,800, 16,000, 16,300, 16,200). This stability masks some important changes with increases in Ophthalmology and Radiotherapy and decreases in Haematology, Rheumatology, Gynaecology and Plastic Surgery.

It is important to recognise the constraints on elective activity under the contracting system in place at that time. Health Authorities and GP Fundholders set specific targets for affordable levels of activity and the consequences, in particular for waiting lists, were not under the direct control of the LRI. In general LRI achieved its contracted commitments and no detailed analysis of these issues was required within our research.

### Waiting times

The quality of elective inpatient care is often assessed simply by the size of the elective waiting list and changes in waiting times. The total number on the inpatient and daycase waiting list rose 'during re-engineering' and fell in the post re-engineering year (7,650, 8,900, 8,000, 8100). The numbers waiting over a year also rose, then fell back and have risen again (0, 557, 63, 476). The LRI did achieve the maximum 12 month wait target for 1996/7 agreed with the NHS Executive and Leicestershire Health with the agreed exception of certain GP fundholding patients.

The proportion of patients not given a specific date for their operation at the time of the decision to admit is measured by the ratio of waiting list to booked admissions. This



deteriorated in the during re-engineering year but then recovered post re-engineering (2.5, 6.1, 5.1, 3.7).

The proportion of patients who were admitted within three months of the decision to operate remained stable over the entire four-year period (at between at 74-78%). LRI revised the original figure of 66% submitted to the national performance tables which was reported as lower than the 71% national average. The proportion of patients admitted within 12 months also remained stable at around 95%, which is the 1997/8 national average figure.

However, any connection between these figures and the aims of re-engineering is tenuous. The waiting list figures are influenced by more important factors outside the Trust's control, in particular the referral rates from GPs, and the financial and contract volume restraints imposed by GP Fundholders and purchasing health authorities. The waiting list expresses the differential between supply and demand rather than the efficiency and effectiveness of the service. Indeed, Trust management believe that there was very clear capacity to reduce waiting times, but that purchasers could not fund the additional activity and hence waiting times could not be reduced as radically as the LRI wanted.

It is clear that the re-engineering initiative has not had a radical impact on the volumes of elective activity nor the waiting lists and times.

## Patient visit

### Daycase care

The percentage of elective activity undertaken as a daycase is generally increasing. Across the hospital, the overall day case rate rose from 55% to 65% over the four years. The rate for the Audit Commission's 'basket' of surgical procedures actually fell from 58% to 54% but still achieved the implied Audit Commission target of 54% given its case mix of procedures. Trends show daycase activity fell by 2% between 1994/5 and 1995/6 but increased considerably in 1996/7 (11%), with a further increase of 12% in 1997/8. The most significant increases have been in Gastroenterology, Radiotherapy and Paediatrics i.e. non-surgical daycases. LRI has generally performed better than the peer groups set up by CHKS, though the definitions used and the comparator group changed from year to year.

### Outpatient care

The changes in the performance measures of the out-patient (or 'patient visit') service are particularly striking:

- 34% increase in the number of clinics planned, but a marked increase in the proportion cancelled (from 6.7% to 17.3%);
- Modest increase in overall activity (4.4% over four years), with an increase in new cases and a fall in re-attendances (ratio fell from 3.15 to 2.59);
- 20% fall in clinic throughput, with the number of new referrals per clinic falling less than the number of follow up visits per clinic;

- Static waiting times for a clinic appointment, but significant improvements in waiting times in the clinic ('30 minute wait').
- Patient 'Did Not Attend' Rate improving slightly from 12.4% to 11.3% (although national performance tables record the 1997/8 DNA rate as 13% against a national average of 11%)

It is difficult to interpret the reduction in throughput per clinic session. The conventional view would see this as a reduction in efficiency. However it could be contended that it reflects the increasing proportion of new patients seen within clinics and an improvement in quality, with more time available for each individual patient in 'one-stop clinics'. The interpretation of the researchers follows this latter view although it should be said that decreases in clinic throughput were not explicitly expected in LRI performance plans. Nevertheless, LRI management are clear that the Trust still exceeded its activity targets agreed with purchasers.

The follow up rates (excluding A & E) have fallen consistently throughout the five year period, with an overall decrease of 18% between 1993/4 and 1997/8. This is traditionally held to be an improvement in performance on the assumption that the reductions might be explained by the removal of unnecessary follow up appointments.

There has been negligible change in the overall proportion of patients who are seen in outpatients within 13 or 26 weeks of referral. Performance in ENT, Oral Surgery and Plastic surgery has worsened in 1997/8 but overall the NHS tables indicate that LRI's performance is close to the average (80% and 96% versus national averages of 81% and 96% respectively).

Performance against the Patient's Charter thirty minute standard was the focus of 'The Twenty Minute Wait Team' established under the re-engineering programme. There has been a continued increase in the proportion of patients seen within 30 minutes at outpatient clinics - rising from 66% at the beginning of 1993/4 to around 90% for each quarter in 1997/8. The NHS performance tables indicate that LRI's performance is exactly the same as the national average. As one of the direct targets of the re-engineering initiative this represents a significant success.

It is again important to note that any hospital's performance in relation to such elective activity is dependent upon the contractual levels agreed with purchasing authorities and fundholders, and the level of expressed demand by general practitioners.

#### Focus on menstrual disorder clinics - primary data collection

The detailed quantitative study of the menstrual disorder clinic shows a variety of changes to the performance and the nature of the service delivered to this patient group.

It is clear that a radically different service was put in place. However, some of the expectations relating to the process of care delivered had not been met at the time of the evaluation. Patients clearly received a consultant-led service, and whilst there are indications that patients were highly satisfied, the objective of producing a 'streamlined' service, with patients attending the hospital on fewer occasions, having more appropriate, and therefore fewer tests, and an earlier diagnosis have not all been realised. The key clinical goal of diagnosis by the end of the first visit ('one-stop to diagnosis') was not testable. The expected increase in medical interventions was not accompanied by a reduction in surgical interventions.

Table 5: Comparison of achievement against targets for re-engineered clinic for Patients with Menstrual Problems at Leicester Royal Infirmary, 1995 – 1996/7

Indicator	Nature of change	Comment
Waiting time for first appointment	Shorter in re-engineered clinic	As intended in plans
Rate of patient failure to attend appointment	Not high in previous clinics. No significant change	Compared with expectation of a reduction due to a more patient-centred system.
Number of visits to hospital during care episode	No change	Compared with expectation of a reduction in the total number of visits.
Proportion of contacts with consultant	Greatly increased (from 3.6% to 37.7%)	As intended in plans
Number of tests	Greater in re-engineered clinic	Compared with expectation of a reduction in the total number of tests.
Types of treatment recommended and carried out	Increase in medical treatment (not after controlling for casemix in the age 41+ group). No evidence of a reduction in proportion of patients having surgery.	Compared with expectation of an increase in medical treatment and a reduction in surgical interventions.
Proportion of cases discharged from care by six months	Lower in re-engineered clinic	Compared with expectation that more patients could be discharged earlier from the reengineered clinic.
Cost of care episode	Higher in re-engineered clinic	

It is not possible to identify the menstrual clinics using routine data sources but there has been a considerable increase (140%) in the total number of Gynaecology clinics held with a modest rise (around 25%) in new patients seen. The clinic throughput fell substantially from 16 to 8 per clinic and clinics cancelled increased from 8% to 21%. The follow up rates are stable (just over 1) as are patient did not attend rates (around 14%).

### Support services

The routine data available to measure efficiency of support services such as theatres, pathology, radiology, pharmacy etc. are very limited indeed. The researchers monitored the trends in levels of activity e.g. number of theatre cases, number of pathology tests etc. but did not develop any new primary data collection to measure efficiency or effectiveness of the support services. In this regard the research was reliant on LRI's own performance measures from within the re-engineering initiative.

### LRI's own measures of performance and impact

LRI monitored performance in the 141 individual projects within the re-engineering initiative. The document "Evaluating Outcomes of the Leicester Royal Infirmary re-engineering programme August 1997"<sup>50</sup> produced by LRI summarises up to 4 measures for each project. A subsequent performance summary updates results of 25 selected measures to April '98.

The robustness of LRI's own performance measures have not been independently assessed fully by the research team. Assessment was possible in a small number of cases and was originally intended to take place for all measures. This has not proved possible as details of the performance measures were not made available to the research team. The researchers are unclear as to the level of quantified measurement undertaken

during the re-engineering initiative. It is perceived that valid assessment of baseline and ongoing performance was undertaken systematically for only a subset of projects.

The performance outcome measures for a number of the projects are reported qualitatively (e.g. increased staff commitment) and 65 of 141 projects do not report any quantifiable measure. Some of the measures have only been monitored for a short period (e.g. change in orthopaedic X-ray delays between November and December 1995) and the sustaining of the performance change is not assessed.

The quantitative measures reported by LRI focus mainly on process and time issues. There are 9 projects reporting improved turnaround times for clinical support services e.g. drug delivery or pathology tests. The other examples implemented across the hospital mainly relate to outpatient clinics (where 30 minute wait, did not attend and follow ups are all reported from the routinely available data) and length of stay reductions for particular subgroups of patients. Other projects relate to staffing issues; staff reductions (mainly in outpatient clinics) and wider nursing roles (see costing section). There are also some marginal reductions in bed-days reported although results of the fracture neck of femur case study are estimated at a substantially different level than that shown in separate data sources from the researchers work and LRI's routine sources.

There are areas, such as the fracture neck of femur case study, where the LRI own performance measures do not match the results found by the researchers. However, in many instances the LRI performance measures are confirmed by the Trust's own routine data sources e.g., in Gastroenterology the number of visits per patient is estimated to have reduced from 3 to 1 for 66% of the attendances, while the Trust's own routine data sources show the overall follow up rate reducing almost as significantly (4.28, 3.8, 3.18, 2.27).

### Summary

Some of LRI's own selected performance measures reveal substantial quality and efficiency improvements. The details of the month by month measurement of process performance for all projects have not been provided to the research team. The improvements within individual sectors of the hospital have produced a marginal improvement in the overall unit costs and general efficiency of the trust, but not a radical transformation.

### Conclusions

There is substantial evidence of marginal improvements in most of the main traditional indicators of efficiency when compared with peers. For most indicators, the Trust started from a significantly better baseline position than most teaching hospitals in England, ranked 1st for several indicators and in the top five for almost all. The hospital's relatively efficient position has been retained or even slightly improved upon. There is little evidence of a dramatic or radical transformation in the hospital's overall efficiency and where one or two indicators do show large improvements there is usually a methodological explanation.

Routine quality indicators remain broadly stable and some particular targets have been exceeded e.g. waiting times in clinics. Waiting lists have risen and fallen more with the ability of purchasers to fund rises in demand than any association with re-engineering. There are minimal measurable changes in other quality indicators (e.g. patient satisfaction in A&E).

More detailed studies of specific process changes have shown a similar picture of modest progress towards achieving process targets. LRI's own performance measurements show some areas where targets set prior to re-engineering were not met. Nevertheless, while not comprehensive, they also indicate some significant improvements in areas not measured by routine data e.g. test turnaround times, stock control levels and clinical assessments by staff with extended skills.

## Costs of the Re-engineering Initiative

According to financial records at the LRI, the total gross cost of the re-engineering initiative was just over £4.5 million. The net cost of the initiative was £4.2 million, the difference being accounted for by income, largely generated as a result of the dissemination exercise (e.g. workshop fees). This is an under-estimate of the true, economic cost of the initiative, as other significant resources were employed (e.g. senior and middle management, clinicians' time etc.) that are not included in these direct financial costs.

The largest single component of the costs of this project this project, around £2 million (47.8% of total net costs), was spent on external management consultant support. The next largest component (38.8% of total net costs) was the pay costs of staff employed specifically on the re-engineering initiative by the LRI. These costs were largely expended on the central re-engineering team and staff working on redesign of the four generic processes, as follows:

- Central re-engineering staff (40%);
- 'Clinical support services' redesign (30%);
- 'Patient Visit' redesign (13%);
- 'Patient Stay' redesign (11%);
- 'Emergency Entry' redesign (6%).

Thus, approximately 70% of those funds spent on staff within the LRI were allocated to either the central re-engineering team or projects working on the re-engineering of support services.

The third specific category of costs relate to redundancy or premature retirement, involving 24 staff and amounting to £385 thousand (9% of total net costs). The remainder (£380 thousand) comprise a range of more modest costs under diverse headings (e.g. capital charges on office space, staff training, books, hospitality, travel etc.).

The great majority of the costs of the re-engineering initiative (94% of the net costs) were incurred in the period up to May 1996 (i.e. within the lifetime of the formal project).

The project costs outlined above include (indirectly) the capital costs of the Balmoral Test Centre, though not of other capital developments that have taken place over the same time period and have supported re-engineering projects (e.g. the Women's Hospital).

In addition to the significant budgeted input of additional staff time, the re-engineering initiative has had an impact on the work of a wide range of other LRI staff. Though the genuine economic costs of these non-budgeted time inputs are difficult to quantify, our research suggests that they may be substantial over the lifetime of any re-engineering initiative.

## Reported savings resulting from re-engineering

There is little indication of improvement in efficiency which are significantly greater than those achieved by other similar units, at least up to the end of the 1995/6 financial year.

Among the objectives set in the programme initiation document of January 1994 was a specific level of cost reduction:

"there is a 10 per cent minimum reduction in the net costs of the key processes which have been re-engineered" LRI, 1994

In September 1997 hospital management stated:

"Recurrent costs savings of approximately £900,000 per annum have been realised and the achievements match the level of ambition sets out in the original programme objectives. However, the timescale for achieving the changes is longer than originally anticipated." LRI, 1997

Indeed, an earlier publication<sup>50</sup> outlined recurrent and non-recurrent savings on a project by project basis and reached a higher total estimate. These optimistic estimates are not, however, wholly accepted by the hospital's management. Those savings identified by the LRI that are genuinely 'cash-releasing' are outlined in Table 6. These savings are recurrent and most were realised from the 1996/7 financial year onwards. Almost all resulted from changes to staffing brought about by re-engineered care processes and changes in staff roles and responsibilities. For example, the establishment of the 'clinic co-ordinator' role in out-patients/patient visit led to reductions in the number of clerical staff upon the appointment of the co-ordinator. The savings are the net result of these staffing changes. The largest area of savings was, however, in the field of supplies where a number of initiatives, facilitated by the external management consultants, resulted in net recurrent savings of £286,000. Although supported (including financially) by the re-engineering programme, it is arguable that these particular savings could have been achieved without the entire re-engineering programme, and were not closely related to the re-design of patient care processes. The LRI would, therefore, claim annual savings of £801,000 and of these some £5-600,000 are clearly associated with the redesign of patient care processes, the central activity of re-engineering at the hospital. However, an internal document from 1995 anticipated that the eventual, recurrent, notional savings (both cash-releasing and otherwise) might be as great as £3.4 million, and would be realised within as little as four years. It should be emphasised that the bulk of these planned savings related to productivity savings and increased efficiency as opposed to strictly cash-releasing savings.

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Table 6: Cash-releasing savings in patient care processes at Leicester Royal Infirmary, from 1996/7

Process	Details	Savings
Patient Visit	Co-ordinator roles	£179,000
	Changes to Nursing Roles	£141,000
Emergency Entry	Staff changes in Accident and Emergency and Fracture Clinics	£128,000
Medicine	Rationalised Nursing Posts/establishing Process mangers	£72,000
Clinical Support	Mainly savings from radiology process changes	£93,000
Supplies	Changes to purchasing policy, bulk purchases, negotiating improved terms	£286,000
Total		£899,000
<b>Total (minus Supplies)</b>		<b>£613,000</b>

Although the hospital has not at any stage repaid the investment directly to either the NHS Executive, the Regional Office or local purchasers, in each of the three years 1995/8 the hospital has allowed £600,000 of capital funds (i.e. a total of £1.8 million) to be used in support of additional clinical activity undertaken on behalf of Leicestershire Health Authority. This practice has become widespread, though the LRI were one of the first hospitals in their Region to transfer funds in this manner.

It is difficult to place any specific financial value on many of the improvements in service quality resulting from re-engineering. It is also difficult to quantify or value the proposed increase in the capacity of the hospital to meet demands to treat increasing numbers of patients. This is particularly so at a time when the main purchasers are unable to fund increased volumes of care, and thorough review of acute services in the district is being undertaken with a view to reducing hospital capacity. The level of investment represented by this project must, however, be placed in context: it represents less than 2% of the hospital's revenue budget for the two year period initially planned for the re-engineering exercise.



## Explaining the Impact of Re-engineering at LRI

In spite of the change observed during the period of this evaluation reengineering has not had the anticipated transformational effect on the process and performance of LRI. Why, in practice, did re-engineering become a more evolutionary as opposed to revolutionary strategy for change, uneven and variable in its impact across LRI? It is necessary to examine three interconnected sets of factors: structural and cultural conditions of LRI; strengths and weaknesses of the programmatic approach to re-engineering adopted within LRI; and the complexity of process re-design in practice.

### Hostile conditions for re-engineering?

Conditions of LRI suggest that there are a number of key issues, challenges and tensions associated with the importation and implementation of re-engineering in acute hospital settings. We suspect that these conditions are not particular to LRI though the size of LRI and the teaching hospital status may intensify the potency of these conditions and their effects upon attempts to redesign patient care processes to create significant organisational change.

Re-engineering's spirit of radical transformation runs counter to experience of change in NHS hospitals as an incremental and very slow process, especially when it is managerially-inspired change directed at professional, clinical work and organisation<sup>51</sup>.

In LRI, managerial power and influence is limited by professionalism and medical autonomy. Top management cannot lead change in the manner envisaged by re-engineering guru's. In LRI re-engineering has not been able to draw upon a dominant managerial ideology to effect change especially in clinical domains.

Re-engineering's emphasis on starting from a blank page is countered by the body of evidence revealing change to be a very contextually sensitive process. Re-engineering targets business processes as the means of change but transformation through patient process redesign involves changing embedded values, ideologies and other cultural features of LRI.

Task specialisation and differentiation are embedded within current work processes within LRI, and reflect values and ideologies of professionalised, clinical occupations within the NHS. The values are embodied and promoted through not only the structuring of hospitals into clinical directorates and clinical specialties but also the broader organisation of medicine and clinical occupations at societal level.

Organisational and work processes within LRI are laced with competition over scarce resources and work jurisdiction<sup>52</sup>. One cannot ignore processes of inter and intra professional competition within LRI on a daily basis for the right to control work processes which in re-engineering terms make up only a small part of a core process. The conditions foster episodic and fragmented views of patient processes at service delivery levels.

## Strengths and weaknesses of the re-engineering programme

This experience of LRI is an example of a programmatic strategy of change<sup>53</sup>. In addition to the above conditions for re-engineering, we regard the programmatic approach to change adopted between 1994-1996 as an important factor to take account of when explaining the impact of re-engineering on the processes and performance of LRI?

The ambition for the programme, and the investment in an infrastructure of internal and external change agents dedicated to re-engineering for a period of time had catalytical qualities in terms of promoting the need for change, providing energy for change, developing and adapting methodologies for change. It is also impressive how throughout the duration of the re-engineering programme at the LRI, senior management support has been sustained. However, in spite of strengths highlighted above, the re-engineering programme exhibited some of the known weaknesses of programmatic change efforts<sup>53</sup>. In some instances, weaknesses appear as miscalculations in the implementation of the programme. In other instances, weaknesses appear to be 'unintended consequences' of the programmatic approach taken to re-engineering. In practice, especially during 1995, the approach taken to re-engineering generated a lot of cynicism and resistance at specialty and directorate levels. In this context, the credibility and legitimacy of many re-engineering efforts within specialties and directorates during 1995 was undermined.

### High ambition

The re-engineering programme was extremely ambitious. This reflected:

- The orthodox re-engineering view that aspirations should be high and that change should be rapid:
- A perceived need to commit to dramatic results in order to acquire external financial support;
- A belief that the dramatic performance of the Neurology 'single visit' clinic in 1992 could be replicated more generally.

High ambition, coupled with publicity about the programme, generated tensions and problems within the process of change. In many instances, the ambition, objectives and self-publicity generated by the re-engineering programme, led to cynicism to re-engineering, rather than interest and enthusiasm amongst the corpus of managerial and clinical staff within the hospital. The programme often gave the impression of trying to do too much too soon. The pressure on re-engineers to set targets quickly and achieve 'quick-hits' encouraged action at the expense of learning and reflection. Re-engineering was a programme often caught between being radical and being realistic about what could be achieved. A&E is one important area of the hospital where re-engineers were criticised for being in a 'rush to pilot' and being 'short-termist' in their actions. Negative perceptions amongst staff about the approach to re-engineering contributed to re-engineers' being frustrated in their attempts to effect changes in patient processes within A&E.

The purpose and ambition of the programme was challenged by some senior clinicians as being based on narrow and limited experience of re-engineering out-patient services and clinical support services. Later in the programme the credibility of plans and aspirations for re-engineering more complex emergency and elective processes were especially doubted.

## Re-engineering laboratories

Re-engineering laboratories were busy places in which great energy and effort were expended on analysing and redesigning processes. However, the re-engineering laboratories were flawed concepts in terms of progressing change in a number of respects. The composition of laboratories was perceived by many doctors to be deficient in terms of expertise, status and knowledge of their members. Whilst the likes of business managers, clerks, nurses, and some professionals allied to medicine were seconded to work full-time within laboratories, doctors were unwilling to be suspend clinical practice to become full-time members of the laboratories. With one or two exceptions, doctors did not suspend clinical practice to become full-time members of the laboratories. Those within the laboratories therefore expended a lot of effort trying to engage doctors in the work of laboratories. The effort yielded some success, for example, some doctors in the specialty of Orthopaedics worked closely with the emergency entry re-engineering team to redesign care processes. However, in general, the engagement of doctors in the work of laboratories was patchy across specialties and even within the same specialty. The staffing composition of laboratories contributed to criticism that those within laboratories were unqualified to redesign processes because of a lack of personal experience or knowledge of a particular specialty or patient service. This argument proved to be one basis on which doctors were able to challenge and regulate re-engineers' efforts to progress change within clinical domains. Ultimately, managers and clinicians at directorate and specialty levels were successful in arguing that the generic core processes could not be redesigned and then 'rolled-out' across specialties.

## Devolution to directorates

That devolution of responsibility for re-engineering projects from a central, dedicated group to functional business managers in the directorates was also problematic. Many business managers' feelings of marginalisation from the initial re-engineering efforts and the existing pressures of business management constituted barriers to the effective transfer of responsibility. The different role, willingness and skill of these managers to re-engineer contributed to a marked variation in the pace of change across the hospital.

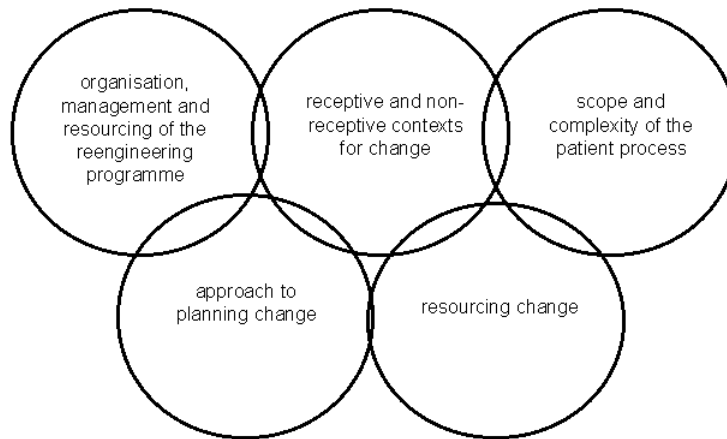
## Management consultants

The management consultants involved with the implementation of re-engineering made a number of important contributions, particularly acting as catalysts and transferring skills to re-engineers within the hospital. They had been specifically selected by the hospital to provide methodological and technical support to the process of re-engineering. However, their impact on hospital is seen as limited. In practice, their lack of experience of hospital processes and the power relations meant that their analytical and catalytic contributions were weakened by their naivety about how to manage change in a NHS hospital.

## Patient process re-engineering

Hostile structural and cultural conditions and strengths and weaknesses of the programmatic approach do not alone adequately explain observed variation in rate and pace of re-engineering across clinical services, specialties and directorates. To fully explain variation it is necessary to examine the complexities of process redesign at a practical and operational level.

## Reengineering Patient Processes



(McNulty 1998)

Analysis of case study data reveals that a number of interconnected organisational and behavioural factors influence the extent to which it is possible to re-engineer patient processes in practice (Figure 1 above<sup>54</sup>). The factors are presented diagrammatically above:

- Organisation, management and resourcing of the re-engineering programme;
- Receptive and non-receptive contexts for change;
- Scope and complexity of patient processes;
- Approaches to planned change;
- Resources.

Organisation, management and resourcing of re-engineering within LRI

The uneven and patchy progress of the re-engineering intervention across LRI over the period of the evaluation is in part explained by processes related to the organisation, management and resourcing of the re-engineering programme over the period from 1994 to 1997. Re-engineering attention and resources were applied unevenly across specialties and directorates at critical phases of the programme, such as the period between March 1995 and October 1995. In spite of plans to identify and re-engineer generic core processes, change interventions needed to be tailored to suit the needs of patient groups, clinical specialties and medical consultants. In an institutional context containing many groupings of clinical specialties and patients there was, in practice, a limit to the number of specialties and patient services that re-engineers could attempt to re-engineer, or encourage to re-engineer, at any one time. Therefore, more by default than design, re-

engineering resources and efforts were dispersed unevenly across the services, specialties and clinical directorates within LRI. For instance, in the period of March 1995 to autumn 1995, considerably more effort was put into re-engineering surgical services than medical services.

The shift of responsibility for re-engineering projects from centralised re-engineering laboratories to clinical directorates in the autumn of 1995 further accelerated the uneven development of re-engineering across the specialties and directorates of LRI. However, somewhat paradoxically, some specialties and directorates that had been barely touched by re-engineering prior to Autumn 1995, such as Gynaecology and the Medical Directorate, proceeded to use re-engineering ideas and methodologies to progress service change very quickly. By contrast, lesser progress was made in the surgical directorate - interestingly an area exposed to re-engineering early in the programme. Finally, limited remaining resources dedicated to re-engineering after May 1996 has meant that there has been little opportunity to direct resources to help progress change in those areas where the implementation and impact of change is identified as slower or requiring additional resources.

#### Receptive and non-receptive contexts for change

The closer one gets to clinical service settings and personalities associated with them, the more one sees how conditions of the service setting and features of the service shape the implementation and impact of planned change interventions. Factors identified as important include:

- Perceptions about the determinacy of the patient process and the extent to which processes can be identified for segments and groups of patients<sup>12</sup>;
- The presence of clinicians, especially medical consultants willing to lead and support re-engineering interventions; processes of organisation and management at directorate and specialty levels;
- Perceptions of clinicians and managers about re-engineering's relationship to the operational problems and issues within the setting; the quality of existing relationships between clinicians within the care process;
- The physical setting for change.

These data suggest that re-engineering claims to be a blank-sheet approach to organisation change are naive in practice. Rather the process of changing is imbued and shaped by the context of change with its associated physical conditions, cultural norms and social relations.

However, comparison between two interventions in the specialty of Gynaecology - the development of the Menstrual Clinic and the re-engineering of the care process for patients admitted for elective Gynaecological surgery suggest the context does not fully account for variation in the pace, progress and impact of change re-engineering interventions. These two case studies reveal two interventions proceeding within the same specialty at the same time, yet experiencing very different processes of 'roll-out' and diffusion. Clearly the context was not uniformly receptive to change interventions and additional explanations must be sought for the differential progress of these interventions. The next factor - scope and complexity of patient processes looks more closely at the

nature of the process being re-engineered, including resource inputs, human relationships and interactions.

#### Scope and complexity of patient processes

Re-engineering aims to eliminate wasteful and duplicating inputs to core business processes. Hammer and Champy<sup>7</sup> attributed much of the wastefulness and duplication within organisations to interdependence within business processes resulting from multi-functional involvement in business processes and task specialisation. Scope and complexity of patient processes refers to interdependence within patient processes and how interdependence may affect the progress and effects of planned change interventions. The scope of patient processes differs according to levels of clinical, directorate and agency inputs and interdependence within patient processes. Complexity associated with re-engineering patient processes differs according to: whether levels and junctures of interdependence are perceived to be in need of change; whether change challenges established roles and routines of service providers within the patient process and whether conflicts over work jurisdiction or scarce resources are generated by the practice, or even the prospect, of change. Issues of scope and complexity reveal the inherent social and political nature of change processes. The more socially and politically complex a change intervention the more difficult it will be to manage the change process and realise intended effects. For instance, re-engineering the care process for patients admitted with a fractured neck of femur is a task of high complexity. The scope of the patient process is broad, incorporating clinical, directorate and agency inputs and interdependence. Creating change at the junctures of interdependence has created conflicts over work jurisdiction and control of scarce resources. By contrast, re-engineering out-patient services in Gastroenterology, has proven to be a relatively less complex task because the scope of the patient process is relatively narrow, with only limited clinical and directorate interdependence. Also, with a limited number of actors involved in the care process, working together in a confined setting role change was more easily negotiated and introduced. Attempts at changing junctures of clinical (and directorate) interdependence through role change have triggered conflicts of jurisdiction between doctors in A&E, nurses in A&E and doctors in the specialty of Orthopaedics. These conflicts have impacted considerably on the rate and pace of change in these instances. Each change intervention generates its own set of social and political dynamics which in turn impact upon the realisation of intended effects of process re-engineering interventions.

#### Approaches to planned change

The preceding factor identifies re-engineering as a complex social and political process and not simply a neutral social technology for change. No explanation of implementation and impact of process redesign would be complete without an analysis of approaches to managing social and political dynamics inherent with re-engineering interventions. Also, how the pace and progress of change interventions are shaped by approaches used within change interventions. This consideration of approaches to change is not just about the application of particular analytical tools, techniques and methodologies of change. Rather, it is about broader issues of leadership, preparation, communication and influence within planned change interventions. In practice, it is the interconnection of processes of leading, preparing, communicating and influencing which determine the strengths and weaknesses of approaches to change. Across the case studies there are some marked differences in the approaches to planned change interventions.

Table 7: The approach to planned change – positive and negative factors<sup>54</sup>.

Factors with a positive impact on the pace, progress and impact of change:	Factors with a negative impact on the pace, progress and impact of change:
<ul style="list-style-type: none"> <li>▪ Internal leadership of change;</li> <li>▪ Clinical ownership and support for change;</li> <li>▪ Weak clinical resistance to change;</li> <li>▪ External support for change both politically and materially;</li> <li>▪ Partnerships of clinicians and managers leading change;</li> <li>▪ Objectives of change that incorporate professional development;</li> <li>▪ Service development or service problem solving.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Externally-led change;</li> <li>▪ Narrow base of change leadership including reliance on a single clinical champion;</li> <li>▪ No clinical-managerial partnerships;</li> <li>▪ Unsophisticated preparation of the process, content and context of the intervention due to imposition of intervention objectives,;</li> <li>▪ Culturally-alien language;</li> <li>▪ Disruptive and intrusive change methods;</li> <li>▪ Poor consultation with stakeholders within the process;</li> <li>▪ Approach to change which is unnecessarily confrontational.</li> </ul>

(McNulty 1998)

In respect of interventions designed to re-engineer patient processes, some interconnected features associated with positive forward movement (see Table 7) are: leadership of change within the specialty or directorate; clinical ownership and support for change; low or non-existent clinical resistance to change; support for change both politically and materially beyond the immediate clinical setting; partnerships of clinicians and managers leading change; objectives of change that incorporate professional development, service development or service problem solving. Cost and activity related objectives alone are unlikely to create sufficient incentives for clinicians to re-engineer patient processes. It is necessary to construct a team of people within the patient process willing to champion process change; formal and informal communication methods that are genuinely consultative are required. At clinical service level, processes of persuasion that are informal, and based on one to one communication with consultants, are critical to the effectiveness of influence strategies. The cases of elective Gynaecology, Gastroenterology, Medicine and Orthopaedics exhibit many of these features.

Features associated with slow rate and pace of change at patient process level include: externally-led change; a narrow base of change leadership including reliance on a single clinical champion; no clinical-managerial partnerships; unsophisticated preparation of the process, content and context<sup>55</sup> of the intervention due to imposition of intervention objectives, culturally-alien language, disruptive and intrusive change methods; poor consultation with stakeholders within the process; and an approach to change which is unnecessarily confrontational.


#### Resources

Classic re-engineering texts<sup>7</sup> suggest that re-engineering releases resources and cost savings through the elimination of waste and duplication with organisational processes. Indeed, LRI's original proposals stated that over a short-time period the programme would be cost-saving. At a corporate level this evaluation has revealed that cost savings accruing from the re-engineering of patient processes have been more difficult to achieve than anticipated at the outset of the programme. At clinical service levels we have observed that the rate and pace of process re-engineering interventions has been regulated, and often slowed, by the need for additional investment in capital, staffing levels or training needs. Re-engineering encountered, perhaps even generated, controversies over resources that have impacted, adversely on the rate and pace of change. By

contrast, certain re-engineering interventions have benefited from extra resources not directly related to the re-engineering programme. Within Orthopaedics re-engineering has helped accelerate change already set in motion by additional resources provided as part of the Orthopaedic Trauma strategy for the locality. Improvements in waiting times and activity in ENT cannot be adequately explained without reference to a recent increase in ENT doctors to deal specifically with waiting list demand. Oncology is a service undergoing patient process redesign. Capital development undertaken independently of re-engineering is a crucial factor in the explanation for this development of the patient process. Some of the work within Gastroenterology and Gynaecology are interventions that benefited from the appointment of process managers and secondment of internal change agents, respectively. Not all areas of the hospital have been able to obtain dedicated resources to progress change interventions. The implication of this finding is that in the context of healthcare patient process re-engineering may actually require resources over and above existing levels.

Figure 2<sup>54</sup> summaries the key factors operating at and below directorate level leading to the considerable variability in the impact and pace of re-engineering across the hospital.

## Explaining Variation in the Implementation and Impact of Process Reengineering within LRI



Organisation, management and resourcing of the reengineering programme	Receptive and non-receptive contexts for change	Scope and complexity of the patient process	Approach to planning change	Resourcing change
<ul style="list-style-type: none"> <li>• application of reengineering efforts and resources</li> <li>• devolution of reengineering to clinical specialities and directorates</li> <li>• limited resources for reengineering over time</li> </ul>	<ul style="list-style-type: none"> <li>• perceptions about the determinancy of patient processes</li> <li>• clinical support and leadership</li> <li>• organisation and management processes at directorate and specialty levels</li> <li>• quality of existing relationships</li> <li>• physical architecture and facilities of settings for change</li> </ul>	<ul style="list-style-type: none"> <li>• interdependence                             <ul style="list-style-type: none"> <li>- clinical</li> <li>- directorate</li> <li>- agency</li> </ul> </li> <li>• changing service provider roles, routines and relationships</li> <li>• work jurisdictions</li> <li>• scarce resources</li> </ul>	<ul style="list-style-type: none"> <li>• internal/external change leadership</li> <li>• clinical champions and championing teams</li> <li>• continuity of change leaders</li> <li>• preparing change intervention                             <ul style="list-style-type: none"> <li>- objectives</li> <li>- targets</li> <li>- communication</li> </ul> </li> <li>• conducting change interventions                             <ul style="list-style-type: none"> <li>- analysis</li> <li>- pilots</li> <li>- language</li> </ul> </li> <li>• influencing clinicians especially doctors</li> </ul>	<ul style="list-style-type: none"> <li>• capital investment</li> <li>• skill-mix and training investment</li> <li>• investment in IT</li> </ul>

(McNulty 1998)



## Conclusions

The LRI re-engineering project was one of the first substantial attempts in the public sector in the UK to draw on the theory and practice of BPR. In both supporting LRI as a national pilot site for re-engineering, and in commissioning this study, the Department of Health indicated a willingness to learn more about the implementation and impact of re-engineering in advance of possible further re-engineering throughout the NHS.

In this case of re-engineering within LRI, it is possible to distinguish between the *intended* strategy of re-engineering and the *emergent* strategy<sup>56</sup>. In the early stages LRI adopted the radical, ambitious approach as exemplified by Hammer and Champy. Indeed, the picture is one of very close adherence to their original prescription. Re-engineers and management consultants employed an orthodox re-engineering method, identifying 'core' processes, which were then redesigned and piloted. The intention was that these would be rolled-out across the entire hospital.

Relatively early in the programme of change, the philosophy began to shift from one of rapid organisational transformation towards continuous, incremental change and improvement. Responsibility for re-engineering was devolved from the 'classical' dedicated team to managers within the clinical directorates. The initial concentration on a handful of 'core' processes was replaced by a plethora of more specific, focused initiatives. Therefore, informed by processes of reflection on the re-engineering experience in 1994 and 1995, and particularly learning about the ability of specialties and directorates to shape the progress and impact of re-engineering efforts, the *emergent* strategy, therefore, deviated from the 'classical' 'intended strategy', in a number of ways, the most important being:

- a departure from an approach to re-engineering whereby responsibility for re-engineering rested within a distinct group of individuals working within a specially created set of change management facilities to one whereby responsibility for re-engineering was more devolved to managers and clinicians with clinical directorates and specialties, supported by a very small dedicated change management infrastructure;
- a shift from patient process redesign efforts focusing on the redesign of generic 'core' processes to patient process redesign being more attuned, in inception, purpose and methodology, to imperatives at specialty and directorate levels;
- a shift of ambition from transformation of organisational processes and performance within two years to a more incremental philosophy of continuous change over a 5-10 year timescale;
- more recently, a reemphasis within patient process redesign efforts to improve the flow of patient processes across directorate and specialty boundaries for key organisational processes relating to emergency and elective care.

## Impact: process and performance

Evidence of the impact of re-engineering on patient processes, as well as organisation and management processes of LRI is consistent with quantitative evidence, suggesting that re-engineering has not to date had a transformational effect on LRI. Our conclusion at this time is, therefore, that whilst the intended strategy of re-engineering LRI was radical and revolutionary in ambition and method, the emergent strategy of re-engineering has proven more evolutionary than revolutionary. The pace of change has been more convergent than transformational in its impact on the processes of organising and managing LRI. These findings complement quantitative measures that suggest the impact of re-engineering in performance terms is less dramatic than anticipated within formal programme documentation prepared for the NHS Executive at the outset of the programme.

### The hospital before re-engineering

It is important to reiterate the initial performance levels of the hospital before assessing the changes arising over the duration of the re-engineering programme. At the start of the initiative, the key features that differentiated the hospital from its peers were:

- A high proportion of emergency work;
- Even taking account of such differences, the hospital was technically very efficient, achieving its activity at costs markedly below what would be expected;
- Relatively poor performance on 'Patients Charter' standards, such as waiting times;
- A reputation locally as being unresponsive to the requirements of other health and social care sectors, such as general practice.

If *improvements* in efficiency were among the goals of this experiment in re-engineering, it is arguable that the LRI was not the most appropriate setting, given its initial performance.

### Partial success

The analysis of routine data indicates that LRI's performance did indeed improve in many respects over the period 1994-98:

- Modest improvements in the efficiency of in-patient care, retaining or even slightly improved upon its efficiency relative to its peers;
- Activity increases, particularly in non-surgical day case treatments;
- Improved and broadly achieved 'Patients Charter' standards.

Whilst still being implemented more slowly and achieving less dramatic improvements than originally intended, some initiatives appear to have had significant and widespread impact:

- Eliminating duplicate or redundant documentation;
- Clinic redesign;

- Near patient testing;
- Laboratory process redesign;
- Revised operating theatre procedures;
- Endoscopy service;
- Supply process redesign;
- New roles (e.g. Process Manager) and multi-skilling (e.g. in near patient testing or operating theatres).

These projects have, however, been varied in their impact across the hospital. In addition, it is not clear that all of the changes observed were intended or that they clearly constitute improvements. Moreover, the 'visit' process and 'clinical support services' received the greatest proportion of investment from the programme, and work to re-engineer these aspects of patient care began at the very outset of the programme, as early as 1994. They might be expected to have achieved more than re-engineering in elective or emergency in-patient settings. Indeed, our studies of emergency care processes and elective day case and in-patient care indicate that changes in these settings have been even more difficult to achieve.

Though significant, savings from the re-engineering of patient care processes have not yet reached sufficient magnitude to repay the initial investment in the re-engineering programme. The programme cannot be said to have 'paid for itself' in any strictly financial sense. Indeed, this was recognised relatively early in the programme, when in 1995/6 the initial loan from the NHS Executive was converted into a grant.

#### Transformation?

In general, the changes in performance fall short of the programme's aims. They do not constitute the 'order of magnitude' improvements that re-engineering orthodoxy suggests. For example, "20% reductions in length of stay"<sup>45</sup> have certainly not been achieved overall, and have not even been achieved for specific groups (e.g. those with fractured femur), and have certainly not been generalised. With the possible exception of waiting times in clinics, patient delays have not been reduced by "two-thirds"<sup>45</sup>. Furthermore, the levels of achievement set out in 1994/5 were certainly not achieved by the target dates set (around 1996), and most have yet to be achieved.

Some promising projects resulted in only limited impact. For example, in the care of patients admitted as emergencies with fractured femur, little progress has been made across most of the quantifiable targets set initially for the project, despite constant, downward revision in the light of experience. In those areas where progress has been made, it has been modest. Progress on earlier discharge has been limited by the willingness and capacity of external agencies to change or expand the services in response to the wishes of LRI staff and the needs of patients.

The Menstrual Disorders Clinic offers a second example. The clinic was established more slowly than initially intended by specialty management. Although it offers a very different service for this patient group, the changes that have actually been achieved are rather different from those intended. To illustrate, the number of attendances per patient at hospital has not been reduced as planned, and the proportion of patients proceeding to

surgical treatment has actually increased rather than decreased. The number of tests conducted and cost per case both increased (c.f. target reductions). Perhaps of greatest significance is that the new patient process is only offered to patients referred to two of the specialty's nine consultants, though two further consultants will shortly adopt the approach. Any benefits will, therefore, be restricted to a minority of patients with menstrual disorders. The re-engineering exercise in the Menstrual Disorders Clinic is probably unique among the projects at the LRI, being the only project which explicitly addresses issues of clinical effectiveness and seeks to change clinical practice. We are not aware of any other project that sought to change clinical as opposed to administrative practice.

Although we have not been able to examine all of the re-engineering projects in the same detail, none of the initiatives we have studied in detail have achieved the magnitude of benefit that was initially intended. Furthermore, re-engineered processes often relate to only one type of patient within a specialty (e.g. patients with hip fracture, patients with menstrual disorders) and have often been implemented by only a minority of consultants.

Improvements in performance resulting from re-engineering at the LRI were generally sustainable. This has been difficult to assess as many patient care processes have not yet been affected by re-engineering, and the promise shown initially in the restricted pilots undertaken by the laboratory teams have rarely been achieved when the revised processes are applied in routine practice. However, when improvements have been achieved they have generally been sustained, with one or two notable exceptions, such as the difficulty of sustaining reduced waiting times in some outpatient clinics.

Many of the specific projects pursued from 1995-1998 at the LRI are similar in nature and scope to isolated projects undertaken at other hospitals, usually described as 'patient focused care'<sup>57,58</sup>, 'care pathways', or 'integrated care plans'. Furthermore, there are a few examples, such as the 'nurse extender' role implemented in a number of North American hospitals<sup>21,59</sup>, which the LRI have not adopted. This specific role has enabled a number of American hospitals to change the skill mix on awards by providing qualified nurses with non-professional support.

If it is the case that many of the specific changes made at the LRI are not unique to that hospital, it is likely that many hospitals will already have adopted at least some of the processes which the LRI have instigated.

It was clearly over-ambitious to attempt to transform the entire organisation in two years. Management theory and experience, as well as the literature on industrial BPR and the more limited literature on hospital re-engineering indicated at the outset that such an outcome was unlikely. Management at the LRI are now of the opinion that this is a 5-10 year goal<sup>47</sup>. The detailed findings at the LRI are similar to the more limited conclusions drawn in other published analyses of BPR in health care.

## Applying Re-engineering in Other Acute Hospitals

Though falling short of organisational transformation, the impact of re-engineering on LRI is sufficient to suggest that it is inappropriate to simply dismiss re-engineering as an ineffective approach to organisational change. Re-engineering is a catalyst for change. Some of the core ideas of re-engineering - process analysis and process redesign - have been and remain important contributors to changing patient processes, and organisation and management of LRI:

"re-engineering's legacy is tools for analysis, an approach to change which suggests not coming up with a solution before you have identified the real problems" (Clinician and Head of Service).

They are enduring ideas within LRI and we cannot rule-out further effects of re-engineering that has already taken place within LRI or will take place in the future. However, processes and performance of LRI have not changed as dramatically or as quickly as 'classical' BPR would suggest, nor senior management initially anticipated, despite the large financial investment by NHS standards, and sustained support and commitment for re-engineering at top management levels. This finding encourages caution about the adoption of re-engineering within hospitals. It is doubtful that the power of re-engineering, or any other managerial technology for change, will achieve dramatic change in hospital processes and performance in the timescales promised in 'classical' re-engineering literature or initially anticipated in LRI.

The experience of LRI suggests that it may be necessary to combine ambition to achieve radical improvements with a more incremental approach to change. Relative to the orthodox re-engineering prescription this means; extended time-scales, and a rejection of rapid models of organisational transformation, however appealing and exciting. Of course, classical re-engineering texts would regard this advice as perhaps losing the essence of re-engineering, but Hammer and Champy did not develop the concept of BPR in contexts where<sup>51</sup>:

- There are hundreds of product lines (i.e. specific patient care processes);
- Managerial power and influence to lead change from the top of the organisation is so problematic, disputed and ultimately limited by professional freedoms and practices;
- Task specialisation and differentiation are embedded features of organising and managing arrangements.

Getting beyond the rhetoric associated with BPR and process redesign as new and novel approaches to organisational change in the NHS is important so as not to lose sight of difficulties of changing healthcare institutions, from which re-engineering is not immune. The history of reform in the NHS suggests that realising intended effects of planned change in hospitals cannot be assumed especially when it is managerially inspired change within clinical domains. Similar to other management ideas and concepts imported into the NHS during the 1980's and 1990's, such as general management and total quality management, the process and fate of re-engineering within LRI has been shaped by features of the setting within which it is being introduced, for example, the politicised nature

of healthcare, professionalism, medical autonomy and limits to managerial power and influence. Whilst it may be a useful exercise to think about re-engineering as changing from a blank-sheet, in practice it is not possible to remove the process of change, or the care process being redesigned for that matter, from its context, with its history, diverse values, norms, patterns of co-operation and conflict.

Re-engineering targets business processes for change. The LRI experience suggests that the task of transforming the process and performance of hospitals is more complex than identifying a limited number (in the case of LRI, first six, then four) of generic, 'core processes', redesigning them and implementing change in a top-down fashion. This methodology reflects a top-down model of change management based on assumptions of clear line management and control. In the context of hospital re-engineering, this methodology does not prepare you for the practical experience of re-engineering. It obscures the reality that transforming organisational performance involves a lot more than redesigning processes, for instance, changing, in a system-wide fashion, roles, relationships, values and organisational forms associated with processes.

The changes to the approach to re-engineering within LRI over the period of this evaluation are themselves acknowledgement that within hospitals the progress of re-engineering interventions is much more dependent on momentum for change at operational levels of the organisation (e.g. directorate, specialty levels) than perhaps was initially appreciated within LRI. The experience of LRI suggests that it is unlikely that sufficient energy and momentum for re-engineering within directorates and specialties can be generated either by top management selling re-engineering to staff or by the skills and enthusiasm of change agents operating outside of these domains. Neither is momentum generated around a set of core processes generated by individuals outside specialties and directorates.

Events within LRI caution against a re-engineering methodology that proceeds on the basis of identifying and then redesigning a limited number of core processes. Within the LRI, individuals at these levels did not appreciate the change agenda being set for them. A major challenge to core process redesign has been the argument from managers and clinicians within directorates and specialties that hospitals have hundreds, if not thousands of processes and product lines, because of the vast array of patient conditions that need to be treated. In LRI this has proven a very effective defence of directorate and specialty practice against imposition of change from outside the specialty and directorate. In practice, the handful of core processes devised by the re-engineering teams proved insufficiently robust at the redesign stage. Much subsequent change activity was led from specialty and directorate levels, reflecting imperatives at these levels rather than a logic of core process redesign.

Top management support is a necessary, though not sufficient condition for re-engineering hospital processes. Neither is a programmatic approach of the sort encouraged by Hammer and Champy, and adopted within LRI, a sufficient condition of success. Change programmes require considerable resourcing. Furthermore, unintended consequences of a programmatic infrastructure related to excessive ambition, and dedicated internal and external change agents working exclusively on re-engineering, can create problems which undermine change as much as progress change.

Significant change in clinical domains cannot be achieved without the co-operation and support of clinicians. Against the background of medical responsibility for patients, interventions designed to change patient processes must attract the support of doctors in particular. Clinical support is associated with process redesign that resonates with clinical agendas related to patient care, service development and professional development. In

clinical domains, process redesign cannot be in practice or perception simply a cost-reduction exercise. Medical support or resistance may be public, overt or nascent. A minimal condition of success for any intervention requiring change in roles, routines or responsibilities of clinicians is that it successfully overcomes, objections real or potential, publicly or privately expressed, of medical consultants. An important part of the influence process by those leading process redesign is persuading medical consultants not to veto interventions, undermine or obstruct interventions. The process of selling re-engineering to clinicians through formal communication exercises designed to deliver the visions and missions of a small group of people removed from operational levels may be limited in impact. Some degree of formal communication top-down communication is necessary and important but on its own is insufficient. To a large degree interesting doctors in re-engineering involves persuasion, that is often informal, one consultant at a time, and iterative over time. Furthermore, clinical commitment to change, ownership of change and support for change constantly need to be checked, reinforced and worked upon. Influence by persuasion calls for great skill, and persistence, especially when it is being done by individuals with perceived lesser status, expertise and experience than doctors.

Whilst generating momentum for process redesign at directorate and specialty levels is critical to the success of a hospital re-engineering initiative, senior management need to guard against process redesign that is incoherent across specialties and directorates. Incoherence can result where process redesign is captured by personal and narrow interests and agendas at directorate and specialty levels. The challenge for senior managers leading re-engineering initiatives is not simply to create and sell a vision of a re-engineered organisation to operational level. Rather, it is to facilitate the development of a re-engineering vision and strategy that frames and shapes process redesign at operational levels, rather than prescribes the content and process of redesign at these levels. Then to encourage the progress of re-engineering via multi-disciplinary teams of individuals drawn from different levels and areas of the hospital to re-engineer processes.

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