

## ORIGINAL ARTICLE

# A case study of systems analysis to improve service in a multidisciplinary outpatient clinic

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## Abstract

**Background/objective:** Innovative ways of improving service delivery often requires testing new ideas. Systems analysis is a validated tool to investigate adverse incidents. This paper describes an innovative usage of this tool for service improvement and redesign in an out-patient setting involving a multidisciplinary team treating women with diabetes in pregnancy at an outer metropolitan health facility in Australia.

**Methods:** Systems analysis tool was chosen to determine the probable causes for prolongation of clinic time causing dissatisfaction amongst the service users and the staff. It provided the template for an action plan regarding work and environmental, organizational process, team, individual, task and patient factors. Remedial actions were implemented over a six month period following this analysis. Timely completion of clinic was the chosen indicator of successful implementation.

**Results:** Several interlinked layers of contributory factors were identified through systems analysis. The large patient load regardless of disease severity was the major contributor. Space restriction for consultation, lesser continuity in the team structure, dated guideline and limited communication between the team members were other factors. Changes implemented included redistribution of patients, adopting new evidence based guidelines, better patient selection accessing the dedicated one-stop clinic and a small change in capacity involving human resources. The service delivery process was restructured in tandem over six months. As a result of these interventions the clinics finished on time generating much greater level of satisfaction among the women attending the clinic and the staff.

**Conclusions:** Redesigning service is an ongoing quality improvement process linked to user and provider satisfaction. Systems analysis is a tool designed to address adverse incidents and identify contributing factors. This study describes an innovative use of the systems analysis tool to improve outpatient services at a district general hospital.

**Trial registration:** Not required.

## Key words

Systems analysis, Service improvement, Multidisciplinary outpatient clinic, Obstetrics

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## 1 Introduction

Testing and implementing new ideas and approaches demonstrates innovation in improvement and development of quality in health service delivery <sup>[1]</sup>. However stimulus for such intervention does not necessarily arise out of routine clinical work. Common prompts for innovative ideas are varied and may for example arise out of the publication of a new guideline recommending changed standards in practice or a new technological advancement. Other important triggers may be patient or staff dissatisfaction with the existing practice or the process of service delivery.

Systems analysis is a tool that is commonly used to investigate adverse incidents in order to identify the gaps and inadequacies in the healthcare system <sup>[2]</sup>. This is based on a model of analyzing human error <sup>[3]</sup> which argues that errors occur from a combination of multiple factors involving individuals and conditions under which individuals work. Systems analysis <sup>[2]</sup> encompasses the whole process of investigation, analysis and recommendation for action.

This article briefly sets out to describe how systems analysis was tested and implemented innovatively to improve outpatient services in a multidisciplinary obstetric clinic at an outer metropolitan area in Australia. It also addresses some issues associated with resource and capability and evidence based practice to overcome barriers to change and successfully achieving satisfaction amongst the women who attended the clinic as well as the clinic staff.

## 2 Methods

The health facility in question is a large outer metropolitan hospital in Queensland, Australia with an annual birth rate of 3500. It provides care to a population of approximately 300,000 covering a geographical area of around 3,179 square kilometers. As an integral part of pregnancy care, the hospital provides high risk obstetric services including care for women with all forms of Diabetes (gestational and pre-gestational) in pregnancy. Historically this service was provided by a multidisciplinary team (Table 1) comprising of obstetricians, one endocrinologist and professionals from the allied health team caring for approximately 400 women each year. All these women were seen on a designated day of the week at a dedicated combined obstetric-medicine clinic during a morning session lasting four hours.

**Table 1.** Members and structure of the existing multidisciplinary team

Medical team		Allied Medicine team	
Obstetric team	Endocrinology team	Diabetes Educator	Dietician
3	1	2 +/- 1	1 +/- 1

The average number of women attending the clinic varied between 40 and 45. Due to the complexity in the care involved and the number of professionals reviewing these women, the clinic would overrun by one to two hours each session. This perennial prolongation of the clinic frequently delayed the afternoon clinic and was generating progressively increasing levels of dissatisfaction amongst both staff and the women attending. Hence a decision was made to reorganize the service to ensure timely completion of the morning clinic to improve efficacy of the overall service focusing on the satisfaction of the women and the staff.

### Identifying issues by systems analysis

Prolongation of clinic time is not deemed an active failure but may be an indicator of failure to deliver quality service. On the other hand there is robust evidence that themed, dedicated one-stop clinics provide better streamlined services. Satisfactory clinical outcomes for mothers and babies were being achieved as per the clinical indicators. However there was a lack of satisfaction among all parties with the existing service. In order to improve service quality a systems analysis of care delivery problems <sup>[4]</sup> was carried out to identify some of the factors responsible for such delays in the clinic.

The joint obstetric medical high risk clinic services were run by a multidisciplinary team consisting between seven and nine members as shown in Table 1. This included a single endocrinologist, three members from the obstetric team, a one dietician who was sometimes helped by another colleague and at least two and occasionally three diabetes educators. A major work issue was the existing workload. All women diagnosed with gestational diabetes mellitus (GDM) were being seen in this single dedicated weekly joint obstetric medical clinic attended by this multidisciplinary team. The number of women varied between 40 and 45 for each session and included women transferred from other obstetric teams. The complexity and severity of the underlying medical condition in the women seen in the clinic varied widely. This included women with very mild diet controlled GDM to those with frank uncontrolled diabetes having multiple maternal and foetal complications. There were logistical problems as most women would need to consult four groups of professionals thus requiring a large number of consulting rooms which were unavailable. This meant some of the team members were providing consultation in make shift areas and at times in the corridor while a woman was waiting. Though there was some continuity in the team structure (same endocrinologist, obstetrician, dietician and diabetes educator) the number of variable members could be up to 50% at times. The existing healthcare provider team members were practicing within their scope and were on the continuing professional development programme of their respective professional regulatory bodies. The guideline available at the time to manage GDM was due for review and was last updated two years previously. An action plan was developed within the facility applying systems analysis to address these issues a summary of which is provided in Table 2. The expected time for implementing the changes was estimated at six months.

**Table 2.** Action plan summary

Factor type	Contributory factor	Existing practice	Remedial action	Degree of achievement
Work and environment	Staffing levels	Table 1	Modify	Achieved
	Workload	40-45 women	Reduce	Reduced to 25
	Clinic environment	No designated consulting area for some team members	Nominated consulting areas	Achieved
Team	Verbal communication	Minimal due to workload	Improve communication	Improved due to workload redistribution
	Written communication	Scanty	Improve	Improved due to workload redistribution
	Consistency in team structure	Partly present	Establish stable team	Dedicated clinic time achieved
Individual	Knowledge	Current scope of practice	Continuing professional development	Two multidisciplinary workshops per year
	Competence	Current scope of practice	Continuing professional development	Two multidisciplinary workshops per year
Task	Availability of protocols	Readily available	Guideline update	Achieved
	Availability of test results	Readily available	No change	–
Patient	Complexity	All levels	Only high complexity	Achieved
	Language and communication	No exclusions	No change	–
Organisational process	Financial resource	Limited	Business case	Partly achieved
	Policy	Dated guideline	Guideline update	Achieved
	Goals	Patient and staff dissatisfaction	Aim for satisfaction at all levels	Improving process but much improved

### 3 Results and discussion

Health service improvement paradigm describes four different drivers using a motivation matrix <sup>[4]</sup>. These are internal, external, voluntary and compelled all of which interact with each other to prompt a need for change. Change however is not as easy to implement since apart from convincing the relevant healthcare professionals there is also the issue of barriers to change.

Presently, all publicly funded healthcare delivery systems operate in a multidisciplinary environment where professionals from different specialties work in tandem within cross functional teams. In these situations the role of each professional from a different background has to be respected when considering any innovative idea for better service delivery. At the same time the nature of barriers to change need assessment <sup>[5]</sup> to determine appropriate strategies. These authors have described a conceptual framework about how to encourage adoption of clinical practice guidelines but admit that behavior change is a process for which multiple change strategies are more effective than single ones.

An important aspect of redesigning service in publicly funded health systems is to strike the right balance between resource and capability while staying within budget. Such strategy harnesses the concepts of resource and capability based theories of competitive advantage.

According to resource based view, the internal processes of an organization create a superior resource bundle combining its tangible, intangible and human resources. In contrast, capability based view argues that advantage is created by the ability to perform a coordinated set of activities superiorly by utilizing the existing resources better than others through repetitive pattern of activities, practiced skills and knowledge. Further discussion about these theories is beyond the scope of this article. Modification of the structure of the multidisciplinary team and service delivery process were the two principal changes that were identified through systems analysis.

#### 3.1 Restructuring of the service delivery team

It was obvious that the workload was overwhelming for the physician who was providing the endocrinology input single-handedly. Fortuitously at around the time when the restructuring was being considered, another physician was in the process of being appointed by the medicine department who already had a special interest in obstetric medicine and agreed to provide the services. Simultaneously an advanced trainee in obstetric medicine started the rotation at the hospital and was available for consultation in the combined obstetric medicine clinic as an extra clinician but at no extra cost to the organization. The physician who had been providing the care previously, welcomed this change and mostly relinquished the clinic to provide other endocrinology services. However this clinician volunteered to provide services for women who could not be accommodated in the dedicated clinic. This change in the structure resulted in much increased capacity in the physician time for outpatient consults.

The major restructuring applied to the obstetric team. The facility had a team of eight consultants but this dedicated service was being provided by only one obstetrician. This was because every woman with GDM was being treated with insulin on failure of dietary modification and lifestyle change. The existing guideline was supportive of insulin therapy only for GDM and hence patient choice was restricted. There was emerging evidence that alternative treatment for GDM with oral medications namely Metformin was extremely effective <sup>[6]</sup> and hence a need for guideline update was identified. Guideline update was completed within 6 weeks following extensive ratification including obtaining expert opinion from faculties across the state as well as from overseas. The major change was replacement of Insulin with Metformin as a first line therapeutic agent to treat women with GDM refractory to dietary and lifestyle modification. Furthermore metformin therapy did not require dedicated input from the physician and diabetes educator like insulin. Hence it was agreed that these women with GDM could be looked after by the parent obstetric team till such time when Metformin would fail to achieve glycaemic control. The expectation was that this would only affect about half of the women commenced on Metformin <sup>[6]</sup> as a first line medication. This in turn would reduce the number of women referred to the dedicated clinic

immediately following a diagnosis of GDM. Simultaneously it would allow provision of more dedicated time to women who required Insulin namely those with Metformin resistant GDM and with pre-gestational diabetes mellitus. This had a favourable effect on the structure of the allied medicine team. As the need for diabetes educator reduced due to the reduction in the number of women requiring insulin, the department replaced one diabetes educator with a dietician who had a bigger role to play in supporting women who were not on Insulin therapy but had GDM. It was also agreed that the same team members would be available for the dedicated clinic as much as possible to maintain continuity of care. In effect this entire restructuring resulted in an overall increase in the personnel number by one (Table 3).

**Table 3.** Members and structure of the existing multidisciplinary team

Medical team		Allied Medicine team	
Obstetric team	Endocrinology team	Diabetes Educator	Dietician
3	1+1	1 +/- 1	2 +/- 1

### 3.2 Restructuring of the service delivery process

A change in the service delivery process was achieved by redesigning the guidelines in light of new evidence where all women with a diagnosis of GDM were treated with oral Metformin as a first line medication on failure of nutritional modification and lifestyle changes. This allowed all these women to be treated by the parent obstetric team thus reducing immediate burden on the dedicated clinic. Only women who would remain refractory to the oral medication would be referred to the dedicated clinic so that more dedicated care could be provided to a high risk group. Two consulting rooms were freed up on the day of the dedicated clinic, where dieticians and diabetes educators could provide consults with the women. To support staff through such changes two multidisciplinary workshops were facilitated every six months organized by the clinical tutors. The faculty was drawn from in-house resources involving obstetricians, physicians, dieticians and diabetes educators.

### 3.3 Barriers to change

As expected with any change in existing practice, some barriers emerged during the consultation and ratification process. The main issue was to do with the safety of metformin use in pregnancy. Despite globally emerging evidence that metformin use in pregnancy was safe, some healthcare providers remained uncomfortable with its use. This is because metformin is regarded a class C pregnancy category drug in Australia <sup>[7]</sup> implying the drug has caused or may be suspected of causing harmful effects on the human foetus or neonate without causing malformations and such effects may be reversible. A multifaceted intervention strategy <sup>[5]</sup> was devised appropriate to the revised guideline and the clinical setting. This included organizing biennial multidisciplinary workshops to encourage interactive, participatory education sessions for all healthcare personnel involved in the delivery of care. Clinical concerns raised at these sessions were addressed by the change agents with multidisciplinary representation. The revised guideline was disseminated both in electronic and printed formats. Leaflets detailing the background to metformin use in pregnancy were produced and handed out to the women in the clinics. Interpersonal communication between the members of the dedicated clinic also helped to streamline the practice thus promoting and maintaining one recommended standard in practice.

### 3.4 Effects of changed practice

Over a period of six months the number of women referred to the dedicated clinic reduced progressively. Currently the maximum number of women seen in the clinic ranges between 20 and 25. This cohort consists mainly of women with more severe form of GDM requiring Insulin and those with pre-gestational diabetes mellitus. The clinical team can provide better care to this combined group since more time is available for one-to-one consultation. The vast majority of these women continue to see professionals from four different groups. The clinic however is much more streamlined and for the past twelve months has been finishing well within time. Initial reports suggest that this is generating a greater level of

satisfaction both among clients and the staff and the data regarding client and service provider satisfaction will be addressed in a separate article. The knowledge, skills and confidence of the staff remains well supported through the ongoing biennial in-house workshops facilitated by a multidisciplinary team the members of which stay up to date through continuing professional development. The revised guideline is due a review in a further twelve months.

## 4 Conclusion

Service redesigning is an ongoing quality improvement process linked to user and provider satisfaction. Occasionally such a process may require testing a new idea or concept in order to address the issue. Systems analysis is an accredited tool to analyze adverse incidents and to identify causes besides recommending remedial measures. This study describes an innovative approach of applying systems analysis to improve outpatient services in a busy health facility with satisfactory results.

## Conflict of interests

The author declares that he has no competing interests.

## Authors' contribution

The author in question has prepared the entire manuscript including analysis of information.

## Authors' information

The author is a consultant in obstetrics and gynaecology and holds an honorary senior lecturer title with the Griffith University, Australia. He also has a postgraduate degree in business administration from Manchester Metropolitan University, UK and has held lead roles in clinical risk management in the past.

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