

# System dynamics and action research in aged care

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## Abstract

*This paper documents an Action Research project undertaken to implement a Continuity of Care Model in an Extended Care Centre. System Dynamics modelling and group-modelling techniques were used to examine and improve patient length of stay (LOS). Several indicators of success of the project are noted. They included the reduction of LOS, improvements in teamwork and staff morale, and various systemic adaptations in other parts of the health care sector. Upstream providers responded to the reductions in patient numbers by swamping the Centre with intractable patients. This effectively reduced up-stream providers' LOS, and returned the Centre's LOS to pre-intervention levels.*

## Introduction

Changes to the framework for hospital funding has resulted in a decline in annual funding and a reduction in bed-based services. This reflects the trend to substitute hospital- and bed-based aged care services with community-based alternatives. Within the Aged Care Program, funding changes have been influenced by an average growth in the older population of 1.9 percent per year. In the Aged Care 1996-1997 Budget, the Department of Human Services (DHS) proposed two sub-acute purchasing models for inpatient services. These included a model for the continuation of the existing variable funding approach, and another that required a redefinition of service targets and funding allocation for streams of care, along the continuum of care, and across inpatient, residential and community settings (Human Services, 1996, Publication No. 96/011). The funding model was based on the principle of substitution of the bed-based service by a community option.

## Organisational context

Health Care Networks were established in 1995 following a review of Metropolitan hospitals and services. Each Network was required to develop a health services plan that would facilitate the redistribution of services and allow for a seamless health service within easy access to those who need them. At the time of this study, the aged care centre was a member of a Health Care Network that consisted of five hospitals that provided a range of clinical services along the continuum of life and in a number of settings.

The extended care centre in which the project was undertaken provides aged care and psychogeriatric inpatient, outpatient, community and residential services. The Inpatient Services, the focus of this project, is structured into four clinical teams, three Aged Care Program teams and one Psychiatric Program team led by Geriatricians or a Psychiatrist respectively. Nursing and Allied Health clinical staff could be assigned to one or more teams providing another level of complexity to the matrix organisational structure. Only the Aged Care teams were involved in the Continuity of Care initiative.

## The management problem

To meet the strategic directives of the Network and the funding requirements of the Department of Human Services, the way that inpatient services were provided needed to change. The targets for the Continuity of Care initiative were agreed in negotiations between management and the Department of Human Services. These were to facilitate the continuity and co-ordination of care between the aged care inpatient and community programs, and to reduce the length of inpatient stay and the cost of the episode of care.

The success of the implementation of an alternate care delivery system that facilitated the continuity and co-ordination of care between the inpatient and community programs was to be considered against the following criteria.

- The development of procedures to facilitate the transition between the Inpatient Program and Community Programs and external service providers.
- The achievement of service targets (including reduced inpatient length of stay).
- Patient / carer satisfaction with the care delivery.

The problem identified was to change the traditional way of providing an aged care inpatient service in order to achieve specified outcome targets where the approach for achieving the targets was not known. This problem was for the Inpatient Services Manager to address. The Inpatient Services Manager negotiated with the General Manager to combine her management role with that of internal consultant and change agent. It was also agreed that the process of change would be facilitated as an action learning project

## The change objectives

The questions that provided some direction for the implementation of the required change included the following.

- What changes were needed to the care management process to enable the implementation of an alternative method of care management?
- What system strategies / tools could be used to inform decisions and facilitate the change process?

In addition, the Inpatient Services Manager wanted to identify the impact the change process would have on the effectiveness of the Inpatient Team, how effective were the leadership behaviours of the Inpatient Services Manager as a change agent, and the key 'understandings' that would enable the Inpatient Services Manager to be effective in future change activities.

An action learning process was to be employed as the change methodology for this project. Success was to be considered against four criteria: ownership of the process improvement strategies by the clinical team members; development of new skills by team members; development of the group as a high performance team; and the contribution to the body of knowledge in the areas of organisational theory and systems thinking methodology as applied to the health care system - and in particular aged care.

## Action research

Action research is characterised as a cyclical inquiry process in which a problem is diagnosed, an action is proposed and implemented and the results evaluated (Warmington 1980; Checkland 1991). The evaluation leads to further insights that are then implemented and again evaluated. An essential feature of the process is the focus on those staff who are assumed to have intimate knowledge of the system and are in the best position to diagnose the problems and implement suggested solutions. These staff are involved in all stages of the research; sanctioning the research, defining the problems, designing the inquiry, collecting and interpreting the data and validating the results, action plan and implementation (Marsh Russell & Robinson 1984).

Cunningham (1993) refers to four varieties of action-research. These are diagnostic, participative, empirical and experimental action research. Diagnostic action research is "... a process of becoming aware of the problem and offering solutions to them" (p. 15). Further, Warmington (1980) proposes an action research process model that emphasises the partnership required by the researcher and those involved with the problem to be examined.

## **The formation of a project team**

This change project required both diagnosis of the problem and the involvement of representatives of all clinical disciplines from the inpatient team. This was important for two reasons. First, that the project scope could be understood and agreed to and, second, that a solution that was acceptable to all could be effected within the time constraints of the financial year. The change process was therefore managed via the establishment of a multi-disciplinary team and the conduct of weekly cross-functional meetings.

## **Reflections**

The Inpatient Services Manager had deliberately not been prescriptive as to the strategies that could be taken to bring about a change to the inpatient process that would facilitate the achievement of the output targets. She had taken the view presented by Burns (1993, p. vii.) that there was "...no single determined future but a panoply of potential futures depending on which purposeful decisions and actions we take. The past is gone forever but the future is still ours to determine".

It became apparent to the Inpatient Services Manager, following the initial meeting, that there were staff who were not comfortable with the abstractness of the process and expected to be told how it was to be done. It also seemed that some staff were not comfortable with the responsibility of identifying the change options to meet the targets of the project. In addition, other clinical staff were not comfortable with the proposal that they would work both in the inpatient setting and in the community setting. The commencement of the weekly forums where issues were addressed assisted in the resolution of this discomfort.

## **Alternative care delivery models**

The research findings of 20 years have highlighted the need to improve the effectiveness of discharge planning of the elderly. Consistently, the studies have identified the shortcomings of discharge as being: poor communication; lack of assessment and planning for discharge; inadequate notice; inadequate discussion; over reliance on informal support; inattention to special needs and wasted or duplicated community visits (Tierney & Closs 1993).

A study by Jewell (1993) examined the process of discharge which included the reason for admissions, the source of admission, assessment, plans of care, decision-making, and discharge and follows up. Lafferty (1996) undertook a review of the literature that evaluated the trend to community-based alternatives to hospital-based services. From this literature, the potential benefits of community-based alternatives were identified as: satisfying patient choice; reducing risks associated with lengthy inpatient stays; improving rehabilitation outcomes and saving money through earlier discharge. A framework for undertaking service evaluations that links the four attributes of service effectiveness, efficiency, patient risk and patient acceptability was provided.

## **Exploration of the inpatient care process**

The creation of the Continuity of Care Model assisted the Inpatient Services Manager, the Project Co-ordinator and the Project Team to identify the time frame for the different components for the new inpatient service, now known as the Continuity of Care project. During the early phase of the project, the team activities centred on the examination of the infrastructure processes linked to the existing inpatient episode of care. The inpatient episode of care commences from the date the patient is admitted to the facility to the date of discharge and is

depicted in Figure 2. The purpose of the inpatient episode of care is to admit aged persons with a health care need who required a multi-disciplinary assessment that results in a diagnosis and treatment plan being made with the aim of appropriately discharging the patient.

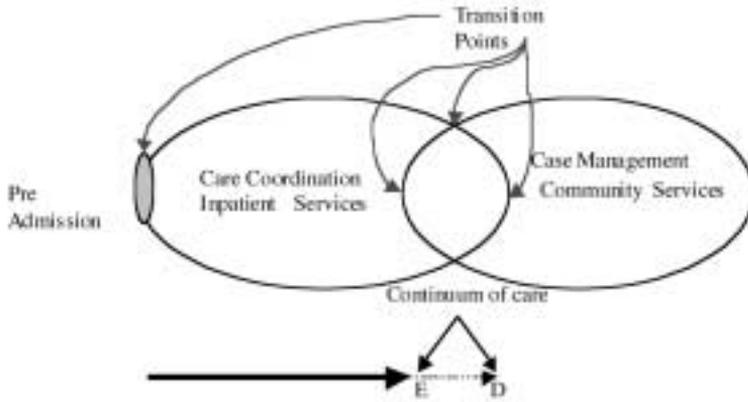


Figure 1. Continuity of care: the model

This horizontal view was expanded to identify the sub-processes involved in the inpatient episode of care (Figure 3). These processes were then examined and documented. As a result, existing and possible areas for benchmarking and reengineering were identified and the Project Team was able to identify opportunities for improvement (Rummler & Brache 1995). These were located at the interface between referral and admission, treatment and discharge and within the treatment process. The key points at which the patient passes from one provider to another or between on step of the treatment process to another.

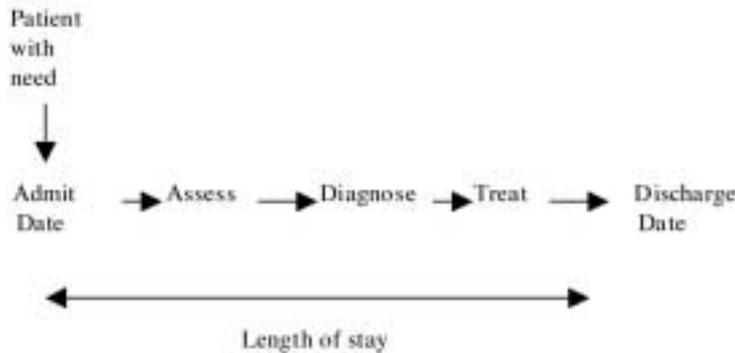


Figure 2. Horizontal view of the inpatient activity flow

System modelling activities were undertaken in parallel with these activities. The information from the early flow-charting of the inpatient process was extended and simulated. The itthink(r) modelling software provided a more detailed understanding of the inpatient process, in particular the admission / discharge process and the availability of interpreters on admission. The simulation provided the opportunity to visualise the impact of the non-availability of an interpreter to assist with the admission assessment on the length of stay of the patient. The clinicians were able to pose “what if” questions that enabled the evolution of possible strategies for change. The process of modelling was undertaken with the clinicians over many weeks. The process and time both helped to elicit relevant knowledge from individual mental models to form an agreed model.

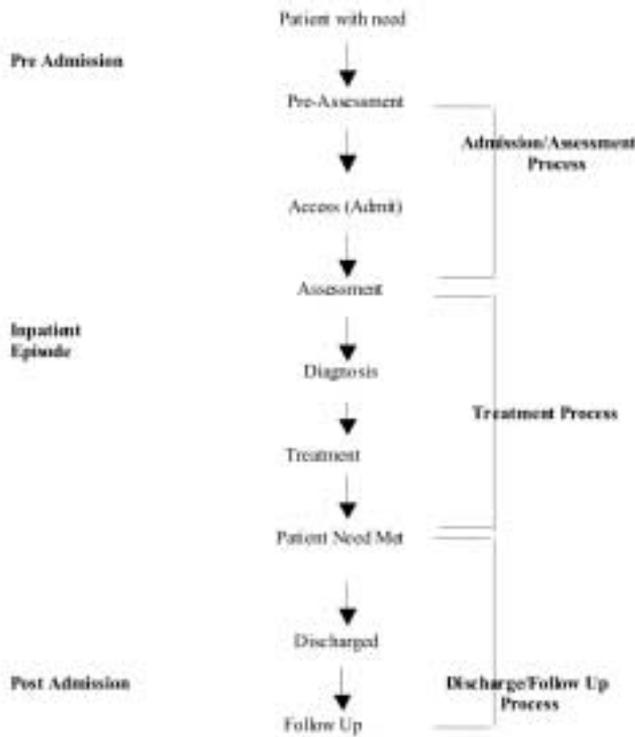


Figure 3. Flow chart of the remapped inpatient process

## Reflections

Understanding the current process required team members to disclose information about how they allocated their time and carried out their work. This disclosure required a climate of trust that was not present in early meetings. There was an initial reticence to disclose information that, in the view of the Inpatient Services Manager, related to competition between disciplines for resources. This hindered the progress of identifying additional resource requirements. In the view of the Project Co-ordinator, it was also related to an uncertainty held by the clinical staff as to how the information would be used by management. She addressed the resistance in one-to-one discussions with representatives from each discipline. Through this process, she was able to reassure each discipline as to the need for the data and encouraged a sharing of data through the weekly forum.

The perceived lack of commitment by the medical staff had also become an issue. The lack of engagement by the medical staff in the planning for the changes in the way the service was to be delivered was raised at the Inpatient Management meeting. Subsequently, the Geriatrician met with the General Manager and the Inpatient Services Manager to clarify what was required in the Continuity of Care project. The confirmation by the General Manager was a “Doctor to Doctor” communication and therefore had credibility. This was a significant event. After the meeting, medical staff became more involved. This was of considerable importance because decisions to discharge within an inpatient setting have been traditionally made within a Medical framework. The move from an Inpatient to a Community model of care represented a move from a medical to a social model of care.

## Implementation of the change

Strategies to improve processes to reduce the length of stay were implemented in mid-March 1997 and fully implemented by the end of April 1997. The initial impact on the inpatient performance indicators was dramatic with a significant increase in activity. Separations (discharges) increased and the average length of stay (ALOS) experienced an overall reduction of 4 days from 24.09 days in March to 19.91 days in April. Although not as dramatic, subsequent months also demonstrated a reduced length of stay, particularly for those in the rehabilitation stream of care. The comparison of the average length of stay by stream of care is shown in Table 1.

**Table 1. Comparison of the average length of stay in days by stream of care**

Stream of care	1996 June	1997 March	1997 April	1997 May	1997 June
Rehabilitation	36.4	32.3	24.6	32.1	33.3
Medical Assessment & Management	18.8	32	25.4	35.6	25.1
Waiting Residential Care	39.4	48.6	31.1	16.7	31.3
Booked respite	9.4	8.7	7.9	9.2	10.7
Others:					
Palliative Care	19.4	0	0	0	7.9
Psychogeriatric	14.9	12.4	0	0	20.1
All streams of care	23.05	22.33	14.83	15.6	21.4

The weekly forums were periods of active reflections on the practice experiences of the preceding week. Individual staff members used the forums to reflect on their practices, confirm their actions and to be reassured. Subsequently, Project Team members were observed to be more confident in their decision making about the community care plan, its implementation and the decision to discharge. During this period, there was a change in the relationship between Project Team members and the Inpatient Services Manager. There was a move from the considering her as “figure head” and as a manager to becoming a “team member” who understood the variety of issues impacting on team members and was seen to be able to balance both the clinical and budget constraints.

## Unintended consequences: the impact of the change in practice on the waiting list

There was an unanticipated impact on the inpatient occupancy and patient mix due to a change in the balance between patient turnover, admissions and the waiting list composition. The implementation of the strategies to reduce the length of inpatient stay resulted in an initial 20% reduction in the rehabilitation stream of care. However, the rate of rehabilitation referrals was not balanced with the rate of discharges. Consequently, patients were admitted from any classification on referral until the beds were fully occupied. This resulted in a change in the mix of patient stream of care with more patients admitted who had more complex needs for care. These patients remained in hospital longer and the waiting list increased with a delay in admission.

The time spent on the impact on the waiting list was a significant period in the evolution of the team, in the shared understandings of the inpatient process and the systemic impact of a change in practice. The outcomes of these sessions were causal loop diagrams (for an example see Figure 4) that provided “... a language for articulating our understanding of the dynamic interconnected nature” (Kim 1992, p.1) of the inpatient process and the systemic impact of the changes that had resulted from the implementation of the Continuity of Care initiative.

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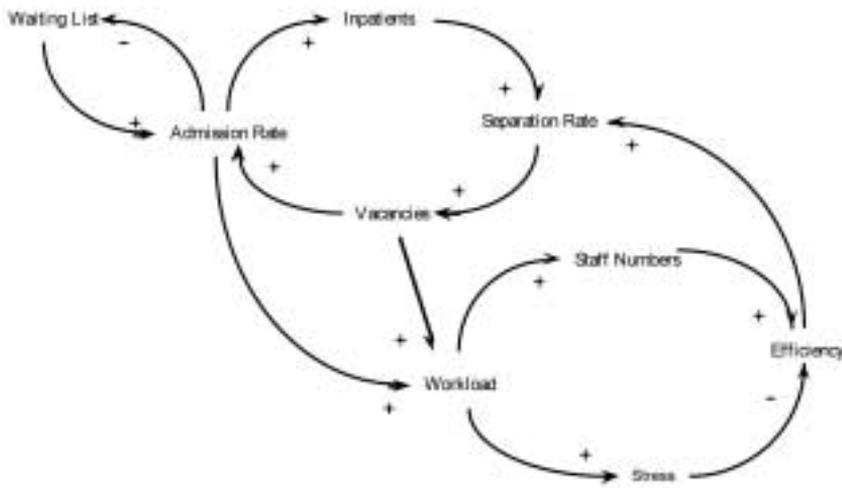


Figure 5. The dynamic relationship between elements of the inpatient process

## The change process

Structural changes have been introduced at the referral / admission / assessment / treatment and separation process to improve communication and decision making between team members about client needs. These have included new and modified referral documentation to internal and external agencies.

The action learning process involved the establishment of a multi-disciplinary clinical team who met weekly to examine the inpatient care delivery system to develop a shared meaning of the macro process and the sub-processes that were integral to the continuum of care.

The action learning process was supported by the use of system methodologies including system dynamics modelling and causal loop diagrams. These were used to develop a better understanding of, individual and team learning activities throughout the change process. System dynamics contributed to the appreciation of the “big picture” of the Inpatient process and provided insights into the use of interpreters at the admit/assess sub-system and the discharge transition (Flood & Jackson, 1991). System dynamic strategies also assisted in the translation of the ideas generated from the understanding of the Inpatient process into the formulation of policies and procedures to improve the Inpatient process. These included the development or revision of various tools including the referral form, discharge checklist, and a community care plan.

All staff now provided aspects of care offsite where previously this would have been undertaken on site or by community and ambulatory services staff. Inpatient treating staff developed a greater awareness of the client’s rights and ability to choose to accept, or not to accept, referral to community services. Improved communication has also occurred between the inpatient treating team and community service providers. Finally, the close working relationship between the Inpatient Services Manager and the Inpatient staff improved the quality of decision making.

The Project Team began as a group of individuals, representing each clinical discipline, who were considered to have the insider view of the Inpatient Services. The composition of the Team throughout the change process consisted of a core membership representing all disciplines but did not directly include medical staff.

Over time, the group members “converted the vision” to “consistent action” by meeting weekly and working together to bring about a change in practice. Initially a “pseudo team”, the Project Team did not take the risks necessary to explore the “panoply of potential futures” or to be accountable for care delivery choices (Burns 1993). Over time, the Project Team emerged as a potential team and began to identify and challenge the

obstacles inherent in a change process. The Project Team achieved outcomes and learnt together to rapidly become a “real” team achieving a high level of performance (Katzenbach & Smith 1994).

There were systemic and structural issues identified during the evaluation focus forums that required ongoing activity. The systemic issues were related to the transition points in the inpatient process at the commencement and end of a client’s inpatient episode of care. Specifically, these were the access of interpreters and the interface between other community service providers, and significantly, the ongoing monitoring of the impact of the introduction of a continuum of care model of service delivery.

The structures identified as being difficult to change were areas that are also considered as being worthy of ongoing activity. They included the ability to set a target date for discharges and anticipated length of stay; pre-admission information on the functional ability of the client; involvement of client, carer / family in developing treatment goals; and reinstating the discharge form to all units.

The Continuity of Care project was extended into the 1997-1998 financial year and beyond and the processes implemented to facilitate and monitor the change process continue. Time will tell if the learning that took place to enable the strategies to be put into place to facilitate a continuity of care will be sustained. As the Inpatient Services Program is a sub system of the Aged Care Program and both contribute to the Health System, it is difficult to introduce change within a local environment that can be generalised to the wider Aged Care or Health System.

The Inpatient Services Manager and the Project Co-ordinator have both developed skills in facilitating change through action and reflection. In the process, they have added to their understanding of their own management and learning styles and have developed a commitment to the use of systems modelling techniques to enhance the change process.

## Conclusion

The organisational benefits have been significant. Improved teamwork and problem solving capability led to documented improvements in the performance of the centre in the key performance area of ALOS. However, these improvements were wiped out by the changes in patient mix as upstream providers took advantage of the improved throughput of the centre by moving more acute patients out of the hospitals and into the centre. Overall, the performance of the network has benefited from the Continuity of Care project. However, on the surface, the performance of the unit that implemented the project has not improved while there has been an improvement in other parts of the system.

This project highlights two important lessons. The first is that the use of action research techniques in conjunction with system dynamics modelling can have a dramatic and positive impact on performance. The second is that it is important for administrators to understand that cause and effect, in this case improvement and benefit, can often be distant in time and space. Funding models must focus on rewarding the areas where improvement is made not the areas where the benefit appears.

## Bibliography

Burgoyne J, Pedler M & Boydell T 1994, *Towards the learning company: concepts and practices*, McGraw-Hill Book Company, London,

Burns R 1993, *Managing people in changing times*. Allen & Unwin.

Checkland P 1991, ‘From framework through experience to learning: the essential nature of action research’, in Nissen H, Klien H & Hirschheim R (eds) *Information Systems Research: Contemporary Approaches and Emergent Traditions*. Elsevier, Amsterdam.

Cunningham J 1993, *Action research and organisational development*, Draeger, Connecticut, pp11-27.

Flood R L & Jackson M C 1991, *Creative problem solving*, John Wiley & Sons, Chichester.

- Human Services 1996, 'Aged Care in Victoria: the 1996-97 Budget', Publication No. 96/011, Victorian Department of Human Services.
- Jewell S E 1993, 'Discovery of the discharge process: a study of patient discharge from a care unit for elderly people', *Journal of Advanced Nursing*, vol 18, pp 1288-1296.
- Katzenbach J R & Smith D K 1994, *The wisdom of teams: creating the high performance organisation*, McGraw-Hill, New York.
- Lafferty G 1996, 'Community-based alternatives to hospital rehabilitation services: a review of the evidence and suggestions for approaching future evaluations', *Reviews In Clinical Gerontology*, vol 6, pp 183-194.
- Kim D H 1992, 'Guidelines for drawing causal loop diagrams', *The Systems Thinker*, vol 3 no1.
- Marsh N, Russell L & Robinson P 1984, 'Using action research to design a management development scheme', *Journal of Management Development*, vol 3, no 2, pp 56-65.
- Rummler G A & Brache A P 1995, *Improving Performance*, (2nd ed.), Jossey-Bass, San Francisco.
- Stacey R 1993, 'Learning organisations and emergent strategy', in Stacey R (ed) *Strategic thinking and the management of change*, Kogan Page, London.
- Tierney A & Closs J 1993, 'Discharge planning for elderly patients', *Nursing Standards*, vol 7, no 52, pp 30-33.
- Warmington A 1980, 'Action Research: its methods and its implications', *Journal of Applied Systems Analysis*, vol 7, pp 23-39.