

# Snakes and ladders: the barriers and facilitators of elective hip- and knee-replacement surgery in Australian public hospitals

Julie L. Walters<sup>1</sup> PhD, BPhysiotherapy (Hons), Lecturer

Shylie F. Mackintosh<sup>1</sup> PhD, MSc, BAppSc, (Physio), Program Director

Lorraine Sheppard<sup>1,2</sup> PhD, MBA, BAppSc (Physio), Associate Professor

<sup>1</sup>School of Health Sciences, University of South Australia, Adelaide, SA 5000, Australia.

Email: shylie.mackintosh@unisa.edu.au; lorraine.sheppard@unisa.edu.au

<sup>2</sup>Corresponding author. Email: julie.walters@unisa.edu.au

## Abstract

**Objectives.** Waiting lists for elective surgery are a persistent problem faced by health systems. The progression through elective surgery waiting lists can be likened to a game of snakes and ladders where barriers (snakes) delay access to surgery and facilitators (ladders) expedite access. The aim of the present study was to describe the barriers and facilitators to delivery of total hip- and total knee-replacement surgery in South Australian public-funded hospitals.

**Methods.** Semistructured interviews with staff, direct observation of administrative processes and documentation analysis were combined under a systems theory framework.

**Results.** System barriers (snakes) were grouped into five categories: resources, workload, hospital engagement, community engagement and system processes. Inadequate resources was the most prominent barrier, patient cancellations resulted in one-third of administrative tasks being repeated and there was a perceived lack of engagement to maximising efficiency. Interestingly, despite a lack of resources being perceived to be the biggest problem, additional resources without system change was not considered an effective long-term strategy.

**Conclusions.** Given the complexity of the elective surgery system, it is not surprising that single-item reforms have not created lasting reductions in waiting times. Multifaceted, whole-system reforms may be more successful.

**What is known about the topic?** Waiting lists and waiting times for surgery are controversial, associated with frequent reforms and negative emotive headlines. We know from existing literature and anecdotal reports that individuals frequently experience lengthy delays before receiving elective surgery. Anecdotal reports also suggest that there are inefficiencies within elective surgery systems that contribute to these delays and result in cancellations, patient deterioration and poor overall satisfaction with the public health system in Australia. What isn't clear is whether this perception is accurate and what inefficiencies do exist that could be specifically targeted for reform.

**What does this paper add?** This paper adds weight to the argument that some inefficiencies exist within elective surgery systems, and identifies specific barriers to the delivery of total hip- and total knee-replacement surgery in South Australian public hospitals. It also identifies several strategies that could improve system function, some of which have already been implemented at a local level in response to stress on the system, and some of which require broad region- or state-wide change. In contrast to existing research, the level of detail provided in the present paper should allow for targeted reforms with the potential to improve system function and the efficiency with which joint-replacement surgery can be delivered.

**What are the implications for practitioners?** All clinicians aim to provide the best intervention for their patients. Should the findings of this study be used to inform elective surgery system changes, patients and clinicians should experience a more streamlined approach to referral for and receipt of elective surgery in public hospitals. The consistency with which barriers and facilitators were identified across the four hospitals involved in this research supports the generalisability of the results. This further suggests that although specific to hip and knee replacement, many of the same barriers and facilitators could be in place across numerous surgical and non-surgical disciplines.

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## Introduction

The overall length of time patients wait for elective surgery is problematic in health systems across the globe, and is often

reported in the popular media under negative emotive headlines such as 'Surgery waiting lists to blow out on Coast' (Australia),<sup>1</sup> 'Orthopaedic waiting lists surge as nurses retire' (Ireland),<sup>2</sup>

'Number of NHS patients missing, waiting time target soars' (UK)<sup>3</sup> and 'Waiting list: dilemma for Medicaid' (USA).<sup>4</sup> The negativity in reporting waiting lists is perhaps compounded by the practice of using them as an indicator of the overall success or failure of a health system.<sup>5</sup> If waiting lists are to be used in this manner, it is important to recognise that they reflect only how efficiently a health system operates, not whether healthcare is ultimately delivered or the quality of that care.

Moving through a waiting list for elective surgery could be considered analogous to a game of snakes and ladders. As time goes by there are periods when a person moves steadily up the waiting list toward the final 'square', their elective surgery. However, there are times where their progress may be slowed as they hit a 'snake' in the system that sets them back. On other occasions a person may reach a system 'ladder' that allows them to progress more rapidly. This process may continue throughout an individual's journey to surgery, potentially resulting in a long waiting time between the decision to seek surgery and the occurrence of the surgery.

Long waiting times have been associated with poorer health, quality of life and patient outcomes.<sup>6,7</sup> Therefore both from a system-operation and patient-care perspective, reducing waiting times remains important. To that end, governments with publicly funded health systems have trialled several reforms, each with limited success in managing or reducing either waiting list volume or waiting time, and in some instances these reforms have had detrimental rather than beneficial outcomes. For example, some elective surgery system reforms, such as the introduction of waiting-time targets,<sup>8</sup> have reinforced the practice of using waiting time to measure success, perhaps increasing pressure on governments rather than reducing it. Other reforms, such as an interim increase in funding allocated to elective surgery<sup>9,10</sup> or the introduction of allied health-led screening clinics,<sup>11,12</sup> have achieved short-term successes that have not carried over to long-term reductions in waiting time for surgery.

Reforms such as the alteration of funding structures<sup>13</sup> and changes to booking processes<sup>13-15</sup> have also been trialled, each similarly struggling to reduce long-term waiting times for surgery. Perhaps as a result of these disappointments, there has been a shift toward strategies with the potential to improve system equity, such as the introduction of priority scoring systems,<sup>13,16-20</sup> rather than a continued focus on waiting time and waiting lists. While equity is important to consider, perhaps a careful analysis of the systems in place to deliver elective surgery may identify factors that affect both system function (in terms of waiting time) and system equity, potentially leading to improved efficiency.

Interestingly, despite a plethora of reports on the elective surgery waiting time issue, we were unable to identify any studies that outlined the specific challenges faced by the public health systems that deliver total hip-replacement (THR) and total knee-replacement (TKR) surgery. Introducing reforms without first identifying where in the system the problems lie is unlikely to be successful. As a result, the present study aimed to describe the barriers and facilitators of elective surgery system function in South Australian public-funded hospitals. The results of this study will not reflect what happens to individuals who use private health insurance to fund their joint-replacement surgery.

## Methods

Under a systems theory framework, the present study used a staged, multimethod approach to examine the structure of the elective surgery system in place to deliver THR and TKR surgery in four large public hospitals (findings not shown), and to describe the barriers and facilitators to service delivery within that system. Stage 1 used semistructured interviews in which hospital staff were asked to describe the system in which they worked, to discuss how effectively it operated and to outline any reforms that might improve system function or, conversely, changes that might make system function more difficult.

Stage 2 used direct observation of the administrative processes involved in delivering THR or TKR surgery in each hospital to triangulate with interview data. The final stage of data collection involved examination of hospital booking documentation. Data collection occurred between April 2008 and October 2009.

This study was approved by the University of South Australia Human Research Ethics Committee and the ethics committees of each participating hospital.

### *Stage 1: employee interviews*

Face-to-face semistructured interviews were conducted with individuals working in the elective surgery system at each hospital. Initially participants were identified by senior management at each hospital and subsequently, a snowball sampling strategy was used. Recruitment continued until data saturation—defined as the point at which participants offered no new information, or were unable to suggest any original interview participants—was achieved.

Interviews lasted between 30 and 90 min. Written informed consent was gained from each participant before starting each interview, and interviews were audio-taped and transcribed verbatim. Field notes taken during and immediately after the interviews supplemented the transcript data<sup>21,22</sup> and were used in place of the transcript where individuals did not consent to being audio-taped ( $n = 2$ ).

A stepped process of thematic analysis was used.<sup>22</sup> Initial familiarisation with the data began during and immediately after each interview, then codes were developed across the dataset. Codes were collated into preliminary themes, which were reviewed and linked back to the original dataset and finally to the research questions.<sup>22</sup>

### *Stage 2: direct observation*

The area of the elective surgery system that was least clear following the interview process was the administrative aspect. Therefore, overt direct observation lasting one complete working day (7–10 h depending on the site) was undertaken<sup>21,23</sup> at each site. One hospital was not invited to participate in these observations as administrative tasks were combined across all surgical disciplines, making isolation of the orthopaedic surgery process impossible.

The observation days took place in offices that accommodated elective surgery system administrative staff. Participants were asked to nominate any day they anticipated to be an 'average' day for observation to be conducted. In consultation with the staff, the researcher selected an observation position, aiming to allow

normal operation of the office but close observation of the processes being undertaken.

## Results

### *Interview participants*

Nineteen of the 28 hospital staff invited to participate agreed to be interviewed. These individuals had a wide range of years of experience (1–30 years) working with elective surgery systems and held a variety of clinical ( $n = 11$ ) and administrative ( $n = 8$ ) positions. However, to maintain confidentiality their specific roles have not been disclosed.

### *System snakes: barriers to THR and TKR delivery*

Based on combined interview and observational data, five categories of system barriers were identified – resources, workload, hospital engagement, community engagement and system processes.

A perceived lack of resources was the most prominent system barrier identified, that is, the barrier that interview participants appeared to feel most strongly about. Specifically, inadequate bed numbers, theatre time and anaesthetists to maintain throughput were considered major problems. Interestingly at one hospital, bed availability was not an issue, apart from at times of peak demand, such as during the winter when hospitals experience a higher number of admissions for medical conditions. A shortage of administrative and surgical staff was also a common problem.

Other barriers falling under the resources banner included a shortage of appointments available in the outpatient (for initial assessment and follow up), auxiliary (i.e. medical imaging) and pre-admission clinics. High numbers of post-operative follow-up appointments and conflicting demand for anaesthetists in pre-admission clinics were thought to contribute to this. The lack of outpatient department and pre-admission appointments was linked to an increase in demand for hospital orthopaedic services and was of particular concern in suburban areas where substantial and rapid population growth is expected. Overall demand for hospital services further increased pressure on elective THR and/or TKR throughput, particularly given the perception that emergency and medical patients were prioritised over elective surgery, resulting in cancellations.

A particularly difficult barrier to address was cancellations. This was a complex task given the number of individuals involved, the urgency with which information needed to be transmitted and the need to repeat tasks in an already overburdened system (for example, rebooking the patients who had been cancelled, and those who were ‘bumped’ to accommodate the cancelled individuals). Reviewing the surgery booking documentation revealed that cancellations resulted in one-third of administrative tasks being repeated.

Within each hospital the hierarchical structure of the elective surgery system and a lack of communication were identified as major barriers in the system. This was supported by reports of late cancellations of theatre lists due to a failure to communicate planned annual or conference leave. Moreover, participants reported friction between the different sections of the system. For example, the reportedly slow changeover time in the operating theatres resulted in an overall perception that the theatres were inefficient, particularly compared with their private hospital

counterparts. Additional criticisms of the theatres related to the inflexible start and finish times and the practice of pre-emptively cancelling cases if the theatre session was likely to run late. While the operating theatres were largely perceived to be responsible for these issues, there was also a suggestion that the late start time was at least in part due to the private practice commitments of the busy surgical and anaesthetic staff. This reinforced the underlying perception of internal friction itself impeding system function.

In addition to internal barriers, several external factors also influenced the ability of the system to deliver THR and TKR, for example, the timing and quality of referrals from general practitioners and the perceived practice of referring a single patient to multiple public hospitals. General practitioners were the main source of referrals to orthopaedic surgical departments, and with no restrictions on where patients were referred to, they were uniquely placed to influence the volume and clarity of waiting lists. Some interview participants also suggested that some general practitioners engaged in ‘gaming’ and overstated their patients’ symptoms in an effort to secure them an earlier appointment in the outpatient department or a higher priority for surgery. In doing so, where they were successful, these physicians acted as barriers in another person’s journey to THR and/or TKR surgery. An associated external barrier was the high non-attendance rate for outpatient department appointments, a concern that reinforced a perception that some patients took public healthcare for granted.

### *System ladders: facilitators of delivery of THR and TKR surgery*

Interview participants were asked to discuss strategies that may have the potential to address identified barriers. These ladders were categorised into four broad rubrics – system processes, hospital engagement, community engagement and resources (Table 1). Many of the strategies recommended appeared to be extensions of changes already implemented, for example the need for increased resources, isolation of beds for joint-replacement patients and greater engagement with the system. These strategies appeared to have been trialled on an *ad hoc* basis, as changes that system employees felt might assist, rather than as part of larger reforms.

Participants from every hospital indicated that even more resources were needed to improve system function. Anaesthetists, consultants, theatres, clerical staff and beds were specifically identified, as were physical space and time. In particular, pre-admission clinic, theatre and outpatient departments needed to be bigger to improve throughput; however, participants acknowledged that the effectiveness of this strategy would be limited by staff and bed numbers.

Despite an anticipated resistance from orthopaedic surgeons, interview participants recommended the introduction of a generic or pooled surgical waiting list to replace the practice of allocating patients to a particular surgeon at the time of their initial consultation. An explanation for this resistance was that individual surgeons could not be confident in a course of treatment if they had not been involved in the initial decision making.

In managing demand for services, several strategies may help. For example, further separation of emergency and elective orthopaedic patients to create an independent orthopaedic outpatient department. Other possibilities included reducing the

**Table 1. System ladders: strategies identified by hospital staff to improve their elective surgery system**  
 HDU, high-dependency unit; ICU, intensive care unit; OPD, outpatient department; PAC, pre-admission clinic

Strategy	Hospital 1	Hospital 2	Hospital 3	Hospital 4
System processes	Generic surgical waiting list Better patient management Separate elective and emergency ↑ use of allied health and nursing for screening and triage ↑ day surgery procedures ↓ number of post-operative OPD appointments	Review use of emergency theatre Separate elective and emergency Transparent decision-making	Generic surgical waiting list Ensure full theatre lists Whole-system change ↓ number of post-operative OPD appointments	Generic surgical waiting list Include waiting time to OPD Prioritisation tool for OPD Multidisciplinary clinic before OPD appointment Pre-habilitation clinic Patient-management protocols (discharge, length of stay)
Hospital engagement	↑ collaboration Clear staff responsibilities	↑ communication Consult staff on workload changes	Engage staff in problem solving ↑ trust between surgeons	Engage theatre staff to address negative perceptions
Community engagement	Regional approach to waiting lists Better-quality referrals Educate patients about waiting lists Better general practitioner–hospital interaction Consideration of the local demographics	Stop general practitioners referring a single patient to every hospital Regional rather than hospital-based medical records	Stop general practitioners referring a single patient to every hospital Better-quality referrals Educate patients about lifestyle Revision patients sent back to the original hospital or surgeon Patients referred to hospital close to home	↑ access for rural patients ↑ communication with patients and community service providers
Resources	Allocate funding close to patients ↑ theatre hours and sessions ↑ staff, infrastructure and PAC appointments Bigger clinic areas	Renovate theatre suites ↑ theatre hours and sessions ↑ staff and PAC appointments Bigger clinic areas	More clerical staff More beds	↑ staff, infrastructure, theatre equipment ↑ post-discharge support ↑ pre-operative support, ICU and HDU beds
Assessment		Clinical decision-making tool		Clinical decision-making tool

number of post-operative review appointments, making greater use of allied health practitioners for triage and screening and better hospital–patient communication. Improved region-wide collaboration (particularly resource and demand sharing across hospitals), greater hospital–general practitioner engagement and improved intra-system cooperation were all considered important strategies.

Over the course of the interviews participants offered insights into changes they believed would not improve the system's capacity to achieve its tasks (Table 2), for example, the introduction of a priority scoring system, due to the preference for

surgeons to retain autonomy, and the development of a standardised referral form without a mechanism for enforcing its use. Interestingly, some of these insights conflicted with strategies that participants had previously indicated might help, and contradict some major focuses in the current waiting list literature.

## Discussion

In our study, the systems in place to deliver THR and/or TKR surgery in South Australian public hospitals had some variability but were fundamentally similar. The elective surgery system

**Table 2. Wobbly ladders: strategies identified by hospital staff as unlikely to improve the function of their elective surgery system**

Strategies	Hospital 1	Hospital 2	Hospital 3	Hospital 4
Procedure change	Priority scoring system More clinics without more theatre time More staff without more theatre time and beds	Priority scoring system	Priority scoring system	Letting patients dictate time of surgery
Hospital engagement	Generic surgical waiting list	Generic surgical waiting list	Generic surgical waiting list	Generic surgical waiting list
Community engagement	Booking surgery far from patients' homes		Standardised referral form	
Resources	Increased funding without whole-system change		Increased funding without whole-system change	
Assessment	Priority scoring system	Priority scoring system	Priority scoring system	Priority scoring system



observed in South Australian hospitals was congruent with the overview of the Australian elective surgery system described by Curtis (2007).<sup>24</sup> Following the analogy of a snakes and ladders game, no single snake was identified that, if removed, would smooth the path to timely delivery of THR or TKR surgery in South Australia. The system snakes were clearly interlinked and together resulted in inefficient processes, patient and employee dissatisfaction, cancellations and, ultimately, long waiting times. The interactions between system snakes were such that there was no one solution to this issue. Consistent with the findings of Briggs *et al.* (2012)<sup>25</sup> in successfully applying a multifactorial approach to reducing waiting times to urology clinics, a number of ladders need to be built to expedite an individual's progress toward THR or TKR surgery.

Some strategies identified in the present study were similar to others reported in the literature. For example, experienced physiotherapists screening and treating non-urgent musculoskeletal patients referred to a large metropolitan hospital in Melbourne, Australia, successfully reduced, by two-thirds, the number of people seen by an orthopaedic surgeon.<sup>26</sup> Other studies have found similar benefits in reducing attendance at surgeon-led low back-pain clinics.<sup>27</sup> A similar strategy adopted in South Australia may reduce the waiting time for an initial outpatient department appointment, the longest delay during an individual's path to elective THR or TKR surgery.<sup>28</sup>

Despite anticipated resistance, another widely reported strategy was the abolishment of surgeon-specific waiting lists in favour of a single waiting list for orthopaedic surgery. This approach has reported success in Canada, reducing the variation in waiting time related to the surgeon or hospital region in the short term and reducing overall waiting time in the long term.<sup>29</sup> There are several other reported snakes that are unavoidable, for example, surgeon, anaesthetist or patient illness. Systems must be able to absorb these unforeseen issues through short-term adjustments. To do this careful examination of individual system structure and function is needed in order to build in appropriate buffers (i.e. an on-call surgeon or anaesthetist to manage staff illness).

Although the internal barriers to system function related to resources or hospital processes could be addressed by the system itself, the external factors (such as political agendas or population growth) may be more problematic because they are beyond the direct control of the system. Smaller issues such as general practitioner referral patterns or appointment non-attendance could be addressed by greater collaboration with local health systems, or possibly through the introduction of email triage systems, which have been shown to reduced waiting time, improve efficiency and reduce costs associated with referrals to a neurology clinic.<sup>30</sup> This may improve the communication processes between referring general practitioners and the elective surgery systems that interview participants indicated were lacking.

A further consideration is the location of each elective surgery system within its local environment. Findings from the present study suggest that many system changes or reforms have been instigated by some need to respond to a change in demand, resources or policy. It is perhaps this evolution of the system that has ultimately become the biggest barrier to be addressed. Reactive growth of a system is associated with a lack of planning,

and the repetitive, paper-based elective surgery system still in place may be inappropriate given concurrent advances in technology, changes in workforce demographics and demographics generally, perhaps resulting in a system that now operates inefficiently.

## Conclusion

The most significant finding of the present study was the unanimous acknowledgement that whole-system change is needed, that one strategy alone (such as increasing theatre hours) is unlikely to make an appreciable difference to system function. No single barrier to service delivery compromised the effectiveness of the elective surgery system independently, rather, it was the combination of many, if not all, of these factors that affected function. Therefore, as has been the case with other health disciplines, interventions directed at improving system function must be aimed at multiple factors simultaneously. This adds strength to the argument that planning is required to ensure that the elective surgery system functions efficiently into the future, in particular, that further system evolutions in response to external or internal stresses, are unlikely to result in efficient management of individuals requiring THR and/or TKR surgery.

## Competing interests

The authors declare there are no competing interests.

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