

## Consequences of Right Siting of Endocrinology Patients – A Financial and Caseload Simulation

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### Abstract

**Introduction:** Right siting has been actively advocated to mitigate rising healthcare costs as well as to free up tertiary resources for the provision of care to more complex patients, research and education. There are, however, concerns that in a block budget setting right siting will reduce patient volumes, thus impacting on subsequent funding allocations and also patient revenues. We sought to determine through modelling and simulation the financial and volume impacts of right siting of endocrinology outpatients in a large tertiary hospital in Singapore. **Materials and Methods:** Data were collected prospectively on patient casemix including complexity (complex defined as requiring specialist care), time required for consultations and revenues garnered. The data were used to simulate 2 scenarios: right siting of all simple cases with freed up resources directed to research and teaching (research scenario) and right siting of all simple cases with replacement by complex cases (service scenario). **Results:** The department sees an estimated 33,000 outpatients per year with a total annual outpatient revenue of \$8.6 million. The research scenario would see a decline in patient volume to 11,880 cases per year which would result in a corresponding decrease in revenue of \$5 million and freeing up of 2.8 hours/ week for each staff. The service scenario yields a drop in patient volume of 9500 per annum and a drop in revenue of \$1.9 million. **Conclusion:** Right siting reduces tertiary care patient volumes and revenues and may discourage right siting efforts. A viable business model for the tertiary institutions is needed to facilitate support for right siting.

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**Key words:** Healthcare costs, Programme evaluation, Public policy

### Introduction

Right siting, defined as “patients treated in the most appropriate locations by medically competent teams at the lower possible cost”,<sup>1</sup> has been on the national healthcare agenda for a number of years, even meriting mention and discussion in the Singapore Parliament. Internationally, the term “appropriate siting” is more commonly used but interestingly, one of the key objectives of shifting care from tertiary to primary care is enhancing access for patients rather than an explicit intent to mitigate costs as espoused in Singapore. In fact, the literature is mixed on the effectiveness of transferring services to primary care. Sibbald et al,<sup>2</sup> reviewing 73 studies involving transfer of care, found “improved access and convenience for patients”, but cautioned that the impact on overall healthcare costs was variable and context specific. There is also the possibility that the quality of care would be compromised if the

transfer of services demanded competencies beyond that of the average general practitioner, e.g. in the performance of minor surgeries.<sup>3,4</sup>

In Singapore, right siting is believed to be necessary to mitigate the rise in healthcare costs, and also to free up resources in tertiary settings to allow specialist clinicians to spend more time on teaching and research, hence furthering Singapore’s aspirations to be a biomedical research powerhouse.

While the theoretical appeal of right siting holds sway amongst government officials and academics, the implementation has been fraught with challenges. These have been articulated previously by one of the authors (JL) and include pricing anomalies where wrong siting may be cheaper from the patients’ perspective due to subsidies based on the site of practice, concerns over the competence of community providers to manage patients who have been

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right sited and the one-stop convenience of tertiary centres.<sup>5</sup> While the patients' perspectives have been well-described, there is a relative paucity of literature on the appeal of right siting from the provider organisation's vantage point. The international experience is unhelpful here as most describe a vertically integrated health system with both primary and tertiary components where funding and resources can be allocated to primary care as necessary, e.g. the devolution of commissioning power to primary care practitioners in the United Kingdom,<sup>6</sup> or a Health Management Organization type organisation with restrictions on specialist access as was especially common in the United States in the 1990s. Singapore is also unique among developed countries in that the public sector accounts for 76% of acute hospital beds<sup>7</sup> and by extension tertiary services while managing only 22% of the primary care workload.<sup>8</sup> This designed "imbalance" is consistent with the government philosophy of catering to the "more costly hospital care" while leaving individuals to provide for the relatively affordable primary care, but limits the capacity of the health system as a whole to transfer resources across healthcare echelons.

We submit that in the Singapore context, the perspective of the healthcare provider is a vital consideration. Hospitals and healthcare providers will need to see tangible benefits or at least neutrality in the impact of right siting on their financial status and operations in order to move beyond the rhetoric into whole-hearted support for right siting initiatives. Right siting is intuitively likely to be a win-win policy for both society and patients through a global reduction of societal healthcare costs and patients' out-of-pocket costs, but subtle push back by providers can scuttle national efforts if they stand to be disadvantaged.

In this study, we sought to determine the potential impact of right siting in specialist clinics, i.e. the movement of outpatients with straightforward diseases from tertiary to primary care. The perspective of the tertiary institution was taken and the focus of attention was on 3 dimensions—financial impact of right siting directly through a reduction in patient revenue, patient volume reductions if simple cases were referred to community providers and the amount of freed up time for clinicians to pursue academic medicine interests. The scope of this study is admittedly limited as the intent was to examine critically revenue differences arising from 2 right siting scenarios and not impact on

societal healthcare costs, clinical outcomes or overall benefit to society.

## Materials and Methods

Data were collected prospectively on all outpatient attendances over a 2-week period in November 2006 from the endocrinology department of a large teaching hospital in Singapore. Physicians were asked to document on specially prepared data capture forms the demographics of the patients seen, the disease condition for which patients presented and their opinions as to whether patients were "simple", defined as cases that could be adequately managed at primary care level or "complex", meaning they required further follow-up in the endocrinology specialist clinic. Administrative outcomes were collected for these patients and categorised into 1 of 5 options (Discharge, Continue follow-up with endocrinology, Transfer to other healthcare provider, Admission, Unknown). Data on 1221 patients out of a total of 1286 attendances during the 2-week period were collected (94.9%).

The results of this census were then matched to a random sample of 330 patients' bills (to ascertain revenue derived from patient fees for consultation, medicines and laboratory investigations) to develop a composite profile of each patient comprising the disease condition, complexity of the condition, i.e. whether "simple" or not, and the total revenue generated by the consultation including associated pharmaceuticals and laboratory tests.

A sample of 105 physicians' consultations was also observed by trained staff to record the amount of time physicians spent with each patient. The data from the time studies were then incorporated with the above profiles for analysis.

## Results

Forty-seven per cent of the consultations were primarily for diabetes while another 33% were for thyroid-related disorders (Table 1). More than half the total number of consultations was deemed by the attending physician to be "simple"; when stratified by disease pathology, 59% of diabetics and 69% of patients with thyroid disorders were deemed to be "simple". Only 12% of "simple" cases were discharged from the clinic (Table 2) and there was no relationship between administrative outcome of consultation and paying status of patients.

Table 1. Case Mix of Patients Seen in Endocrinology Clinic during Census Period

Patient's diagnosis	Diabetes only	Diabetes and other endocrinology pathology not including thyroid disease	Thyroid disease and other endocrinology pathology not including diabetes	Other endocrine pathology	Unknown
	462 (38%)	109 (9%)	400 (33%)	187 (15%)	63 (5%)

Table 2. Administrative Outcome of “Simple” and “Complex” Cases

Administrative outcome	Complexity of cases	
	Simple	Complex
Follow-up endocrinology outpatient consultation scheduled	73%	77%
Discharge from endocrinology department	12%	4%
Referred to other healthcare providers for follow-up	4%	7%
Admission to inpatient facility	0%	1%
Unknown	11%	12%

Financial analysis showed that “complex” patients on average consumed S\$37 more in services and pharmaceuticals compared to “simple” patients (S\$248 versus S\$285) and time analysis demonstrated that “complex” patients required an additional 5.5 minutes worth of consultation time.

Two deliberately extreme simulations were then carried out to represent a steady-state Research Scenario and Service Scenario that were modelled over a 1-year time span and an estimated 33,000 outpatient attendances (Fig. 1). The percentages of “simple” and “complex” cases were averaged out to be 64 and 36% respectively assuming the 11% classified as Unknown were evenly distributed.

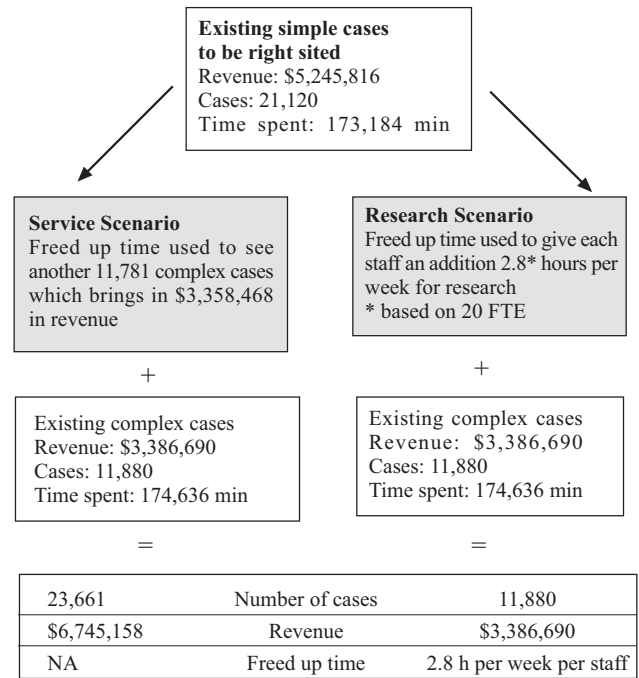
*Research Scenario*

In the Research Scenario, there was no replacement of “simple” patients who were right sited and all the freed up time was assumed to be utilised for academic purposes, i.e. teaching and research. The endocrinology department would then face a reduction of S\$5.2 million in patient revenue per annum and reduce its outpatient workload from 33,000 consultations to 11,880, a decrease of almost two-thirds. Significantly, the freed up time for academic activities would be 2886 hours per year or an average of 2.8 hours per week per staff (the department has a full-time equivalent staff strength of 20 physicians).

It should be noted that under the current funding system, there would be limited increases in funds for teaching as hospitals are provided payment on a per student basis and research grants (other than Clinician Scientist Schemes) typically do not provide for physician salaries or opportunity costs.

*Service Scenario*

In the Service Scenario, all “simple” cases were right sited but replaced with “complex” cases to model the optimal utilisation of tertiary institutions in managing only complex patients. This would result in a revenue decrease of S\$1.9 million per annum and a decline in consultations of 9339 (28%).



The endocrinology outpatient service currently has an estimated annual revenue of \$8.63 million.

Fig. 1. Schema illustrating derivation of Research and Service Scenarios and the impact on volume of cases, revenue and freed up time.

**Discussion**

The treatment of patients in the most appropriate echelon of a healthcare system has attracted intense policy interest for many years. However, transfer of care from hospital outpatient services to primary care with no follow-up does not seem to be well evaluated with only 1 study involving follow-up for carpal tunnel surgery patients in the scientific literature.<sup>10</sup> This current analysis contributes useful insights into 2 related issues: the magnitude of inappropriate siting of care within Singapore’s healthcare system and the financial disincentives to hospitals to actively endorse and effect right siting.

*Magnitude of Inappropriate Siting of Care*

Anecdotally, physicians and policy-makers have long suspected that a significant proportion of patients currently consulting at specialist outpatient clinics are doing so inappropriately from a clinical perspective and that the care of these patients could be taken over quite reasonably by community-based family physicians. Previous work done by the SingHealth Centre for Health Services Research suggests that as many as 30% of patients seen in renal specialist clinics have early kidney disease which can be managed by family physicians, as is the practice in other countries such as the United States and the United Kingdom.<sup>11</sup> In a study on outcomes following referral to a

cardiology service, Kwok et al<sup>12</sup> found that 14.5% of referrals were discharged after the first consultation and another 11.2% defaulted after the first visit. This current study reveals that hospital physicians practising in an endocrinology service believe that more than half their outpatients can be managed successfully by family physicians and reinforces this belief that there is likely to be a substantial degree of inappropriate siting of care and sub-optimal utilisation of scarce tertiary resources.

However, transferring patients from tertiary to primary care providers will not be straightforward. The absence of incentives to hospitals to right site as described in this paper has been noted by Craig et al<sup>13</sup> in the United Kingdom and the authors have additionally identified other barriers to shifting including insufficient and inflexible resources and the hospitals' doubts about the capability of the primary sector to take on additional workload and responsibilities. In the Singapore context, all are likely to be relevant. As described earlier, government subsidies for healthcare are restricted to public institutions and government polyclinic physicians are already seeing 58 patients per day on average with little capacity to expand services.<sup>8</sup>

#### *The Cost of Right Siting to Hospitals*

Despite the theoretical appeal of right siting as a policy and the intuitive benefits successful implementation would bring to society as a whole, right siting will have a profound negative impact on tertiary institutions' financial position, especially in the current financing framework where outpatient services are subvented by the Ministry of Health on a block budget basis, i.e. the Ministry of Health provides a fixed annual budget to government healthcare providers to subsidise clinical services for public patients.

An examination of Singapore Health Services' annual report highlights that patient revenues accounted for S\$802 million in financial year 2006, approximately 47% of total revenues and S\$83 million more than the amount Singapore Health Services received in government subvention.<sup>14</sup> Patient revenue is highly dependent on patient volume as public hospitals operate on a fixed fee schedule with no options to surcharge for longer consultations or more complex disease presentations.

As demonstrated in the simulation above, right siting either to free up capacity for education and research or to utilise specialists' time more effectively in seeing complex cases comes at a high financial cost to the hospital. In any given year, the quantum of subvention is determined in advance and there is no established mechanism to top-up if hospitals elect to forego volume and hence revenue by right siting "simple" cases and focusing on complex cases. The formulae used in determining the block budget is not

publicly known but it is reasonable to assume that the workload of the institutions as determined by patient consultations would be an important factor. Right siting would thus impact on the hospitals at 2 levels – the immediate drop in patient revenue and the reduction in the total number of patients seen – which would potentially compromise future years' budget apportion.

The potential benefits of right siting in freeing up time for clinicians to concentrate on research and education are also relatively modest compared to the high opportunity cost of not providing direct patient care. The alternative solution for hospitals of simply backfilling clinicians to provide patient care is unrealistic as there is a national and global shortage of healthcare workers which will persist for the foreseeable future. Singapore estimates that 2000 doctors will be needed to meet national needs while the World Health Organization estimates a global shortage of 4.3 million healthcare workers.<sup>15,16</sup> Hence, if public hospitals operating on a block budget pursue the aspiration of academic medicine, it will be at a heavy price in terms of patient revenue.

#### **Conclusion**

*"When a patient who can be adequately treated by a GP is instead managed by a specialist in a tertiary hospital, it means a waste and abuse of expertise, at the expense of the seriously ill who require the expertise of the specialist."*

Minister Khaw Boon Wan  
China Singapore Joint Healthcare Forum 2006<sup>17</sup>

Right siting is considered to be vital to the continued sustainability of Singapore's healthcare system. Healthcare will always be resource-constrained and we will need as a society to ensure the best use of scarce healthcare resources of manpower and infrastructure. Despite the evidence of substantial misuse of specialist clinic resources, public hospitals do not have a viable financial model to promote right siting without risking significant loss of patient revenues. This study has shown revenue losses whether right siting is intended to free up time for academic practice or to cater to patients with more complex diseases. Right siting is a complex multi-faceted issue that will require multiple interventions at multiple levels to optimise its fullest potential. However, while efforts are made to establish shared care programmes, correct pricing anomalies and educate the public more fully on the types and indications for the different echelons of healthcare, we submit that one key consideration is the need to better align societal and provider interests such that providers are incentivised not so much on the volume of patients seen or procedures carried out but on the value that they create for patients individually and society as a whole.

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